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Geology and Ground-Water Resources of the Lower South Platte River Valley Between Hardin, Colorado, and Paxton, Nebraska

L. J. Bjorklund

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GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1378

Prepared as part of the program of the Interior Department for development of the Missouri River basin

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By L. J. BJORKLUND *and* R. F. BROWN

With a section on

CHEMICAL QUALITY OF THE GROUND WATER

By H. A. SWENSON

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By L. J. Bjorklund and R. F. Brown

ABSTRACT

The study of the geology and ground-water resources of the lower South Platte River valley was made by the Ground Water Branch of the U. S. Geological Survey at the request of the U. S. Bureau of Reclamation and with the endorsement of the Colorado Water Conservation Board. The area includes parts of Colorado and Nebraska, covers about 3,200 square miles, and ranges in altitude from about 3,000 to 5,000 feet above sea level. The average annual precipitation in the area is about 16 inches and is sufficient to support grasses and some grains. Irrigation utilizing water diverted from the river and pumped from wells is extensively developed in the valleys of the South Platte River and its tributaries. The principal agricultural products are corn, sugar beets, alfalfa, beans, wheat, barley, and livestock.

The rocks exposed in the area are sedimentary and range in age from Late Cretaceous to Recent. The Pierre shale underlies the entire area. The Fox Hills sandstone and the Laramie formation underlie the western part and the Chadron, Brule, and Ogallala formations underlie the eastern part. Pleistocene and Recent alluvium underlies the valleys of the South Platte River and its tributaries. The Pierre shale ranges in thickness from about 2,500 feet near Paxton, Nebr., to about 6,500 feet near Hardin, Colo., and yields water in small quantities to wells in the vicinity of Sterling, Colo. Within the area, both the Fox Hills sandstone and the Laramie formation range in thickness from a featheredge to nearly 200 feet and yield small quantities of water to stock and domestic wells. Although a test hole near Proctor, Colo., was drilled 102 feet into the Chadron formation, the total thickness of the formation was not ascertained; no wells within the area covered by this investigation are known to derive water from the formation. The Brule formation ranges in thickness from a featheredge to more than 500 feet and yields water to wells from fractured or porous zones. The Ogallala formation ranges in thickness from a featheredge near Sedgwick, Colo., to about 350 feet near Paxton, Nebr., and yields large quantities of water to wells. The alluvium ranges in thickness from a featheredge at the edges of valleys to about 300 feet in some places in the valleys. The alluvium occurs in two physiographic forms—Pleistocene and Recent terrace deposits and Recent flood-plain deposits—and yields abundant water to irrigation, public-supply, and other wells. Dune-sand deposits cover part of the area, range in thickness from a featheredge to about 100 feet, and yield water in small quantities to stock and domestic wells. Loess deposits cover much of the area and range in thickness from a featheredge to about 50 feet. Generally the loess is above the water table and is not known to yield water to wells.

The principal source of ground water in the area is the alluvium of the South Platte River valley and of the tributary valleys of Lost, Kiowa, Bijou, Sand Arroyo, Badger, Beaver, Wildcat, Pawnee, and Lodgepole Creeks. The water table in the tributary valleys slopes downvalley toward the river; its gradient is similar to that of the valleys. The water table in the South Platte River valley slopes diagonally downstream toward the river. Where the alluvium is bordered by the moderately permeable Fox Hills sandstone or the Laramie or Ogallala formations, the water table generally extends into the bedrock formations without any significant change of slope or shape.

In areas where irrigation water from the river is supplemented by pumping from wells, the water levels generally neither rose nor declined during the period 1940–50. However, in the areas where irrigation supplies are obtained wholly from wells, the water levels declined steadily. The decline in the Bijou and Kiowa Creeks area was about 8 feet, of which about 2 feet occurred in 1950. The average decline in parts of the Beaver Creek valley was about 4 feet, of which about 1 foot occurred in 1950. The decline of the water table is most critical in the Beaver Creek valley, owing to a relatively thin saturated thickness of the water-bearing material. The most critical decline in the Beaver Creek valley is in the vicinity of Gary, Colo., where water levels declined 2 feet during 1950 and 10 feet during 1940–50.

Recharge to the ground-water reservoir is effected by seepage from canals, reservoirs, and irrigated land, by precipitation in local and adjacent areas, by seepage from streams, and by subsurface inflow of ground water. Discharge of ground water is effected by evaporation and transpiration, seepage into streams, outflow as springs, and subsurface underflow out of the area, and by pumping of wells. About 12,700,000 acre-feet of water is stored in the alluvium in the project area. Under present conditions, a gain or a loss of about 175,000 acre-feet of water is represented by each foot of rise or decline of the water table.

It is estimated that about 1,380 irrigation wells were in operation by the end of 1950. The pumps on about 71 percent of these were powered by electricity, about 17 percent were powered by tractors, and about 12 percent were powered by stationary combustion engines. Total pumpage during the 1946–50 period ranged from about 123,000 acre-feet in 1947 to about 281,000 acre-feet in 1950.

Municipal water-supply systems at Fort Morgan, Brush, Merino, Sterling, Iliff, Crook, Sedgwick, Ovid, and Julesburg, Colo., and Big Springs, Brule, Ogallala, and Paxton, Nebr., all derive their water from wells. Domestic and stock water supplies throughout the area are derived from wells.

Chemical analyses were made of 123 ground-water samples that were taken from the alluvium, dune sand, and bedrock formations. Water from the Pierre shale generally is soft, sodium and bicarbonate being the principal constituents, but the dissolved solids are high. Water from the Fox Hills sandstone is soft and has a moderately high content of dissolved solids. The Ogallala formation yields moderately soft calcium bicarbonate water that has a dissolved solids content ranging from 152 to 396 ppm (parts per million). The dune sand contributes moderate amounts of soluble minerals, and the water generally is soft. The alluvium of the South Platte River valley yields water in which calcium and sulfate compose much of the dissolved solids and which generally is hard. The ground water in tributary valleys to the South Platte River valley is similar in chemical quality to that in the main valley. Diverted river water used for irrigation tends to increase the mineral content of the ground water.

Wells that would yield 500 to 1,000 gpm (gallons per minute) can be developed in most places in the alluvial deposits that underlie the valleys of the South Platte River and its tributaries, and wells that yield as much as 2,000 gpm probably could be developed in the thick saturated sections of alluvium in the valley of the South Platte River. A balanced surface- and ground-water irrigation system could be established by pumping water for irrigation from wells in seep areas, thus reducing the amount of surface water needed. Where the ground-water reservoir is replenished by recharge from the South Platte River and from adjacent areas during the nonirrigation season, large quantities of water could be pumped from the ground-water reservoir into canals and reservoirs during the irrigation season. Hydrologic studies should be continued in the lower South Platte River valley.

INTRODUCTION

PURPOSE AND SCOPE OF THE INVESTIGATION

This investigation is one of several being made by the U. S. Geological Survey as part of the program of the Department of the Interior for the control, conservation, development, and use of the water resources of the Missouri River basin. The study of the geology and ground-water resources of the lower South Platte River valley was made by the U. S. Geological Survey at the request of the U. S. Bureau of Reclamation and with the endorsement of the Colorado Water Conservation Board. The study was intended to aid in the formulation of plans for future development of the area, including the effective utilization of water from the Colorado-Big Thompson and other transmountain diversions. The investigation was made in order to determine the character, thickness, and extent of the water-bearing formations, and the origin, quality, quantity, movement, availability, and use of ground water in the area. This report includes data collected during the investigation, from April 1947 through December 1950, and earlier data taken from reports on water levels in Colorado and Nebraska.

LOCATION AND EXTENT OF THE AREA

The area investigated includes the South Platte River valley from Hardin, Colo., to Paxton, Nebr., a distance of about 200 miles, and parts of tributary valleys. (See figs. 1 and 2*A*.) The area includes parts of Adams, Logan, Morgan, Sedgwick, Washington, and Weld Counties in Colorado and parts of Deuel and Keith Counties in Nebraska, and covers about 3, 200 square miles. About one-third of the area is in the tributary valleys in and south of Morgan and Weld Counties.

PREVIOUS INVESTIGATIONS

Several studies have been made concerning the geology or ground-water resources of all or part of the area under consideration.

Meek and Hayden (1862), Hague and Emmons (1877), King (1878), White (1878 and 1879), and Eldridge (1889) mentioned the geology of this area in general reports that described large areas of west-central United States. Darton (1905) made a reconnaissance

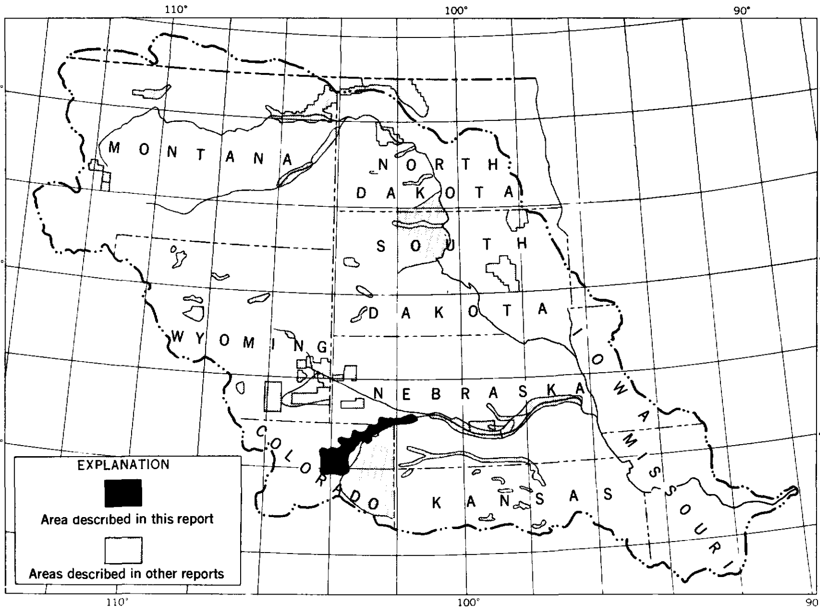

Figure 1. — Map of Missouri River basin showing area in which ground-water studies have been made under the program from development of the Missouri River basin.

of the geology and ground-water resources of the central Great Plains, including the South Platte River valley. Slichter and Wolff (1906) prepared a report on the amount of underflow in the South Platte River valley between Sterling, Colo., and the confluence of the North and South Platte Rivers. Meinzer (1919) made a ground-water investigation of Lodgepole Creek valley in Wyoming and Nebraska. Henderson (1920a, b) discussed the geology of the drainage areas that are tributary to the South Platte River. His reports emphasize paleontology but include brief discussions on lithology and stratigraphy. Cretaceous stratigraphy and structure are discussed in a report by Mather, Gilluly, and Lusk (1928). Dobbin and Reeside (1929) described the contact of the Fox Hills sandstone and the Laramie formation, and Lovering and others (1932) redefined the Fox Hills sandstone and placed the lower limit at a mappable horizon. Several reports, notably those by Rankin (1933), Dane and Pierce (1936), and Van Tuyl and others (1938), describe petroleum investigations in northeastern Colorado. Bryan and Ray (1940) gave detailed descriptions of terrace deposits in the South Platte River valley west of the area covered by this investigation and discussed the Pleistocene and Recent history of the region. A report on the geology and ground-water resources of Keith County, Nebr., by Wenzel and Waite (1941) was used extensively in the preparation of the part of this report

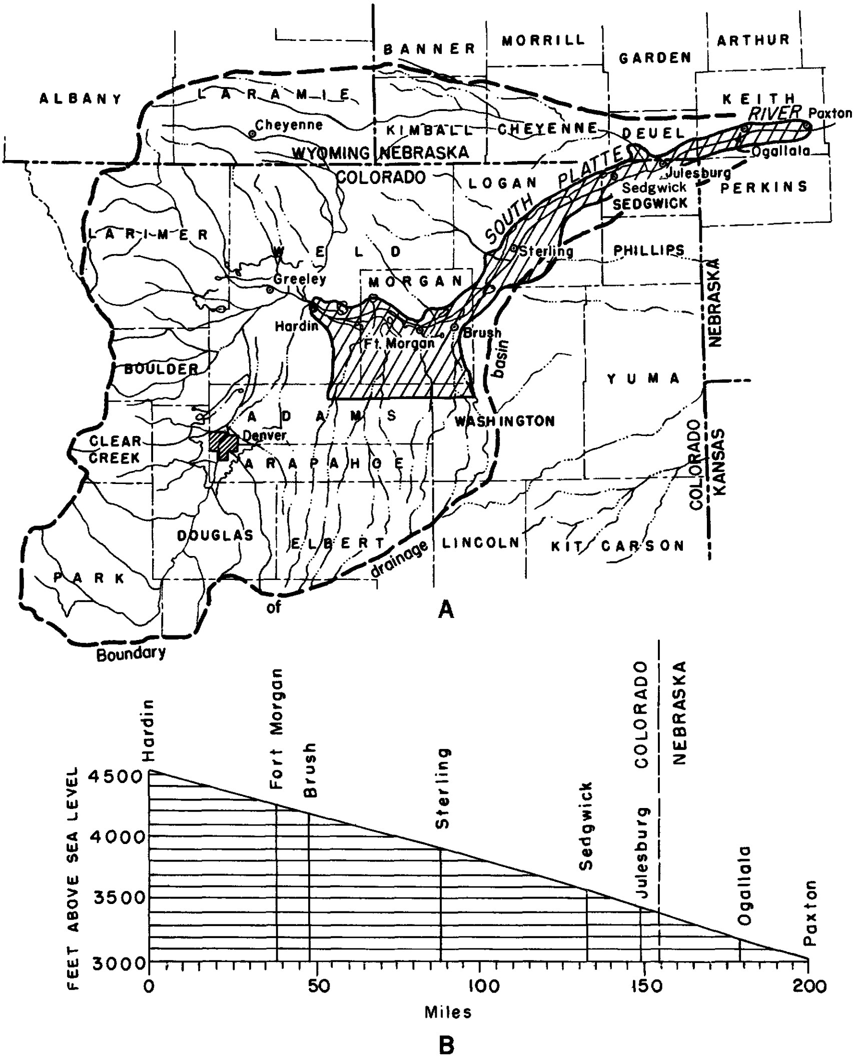

Figure 2.— *A*, Map of South Platte River basin showing area included in this report; *B*, Idealized profile of the South Platte River between Hardin, Colo., and Paxton, Nebr.

that pertains to Keith County. Several reports by Condra and others (1940, 1943, 1947) on the geology of Nebraska are applicable to this area. Two publications by Code (1943, 1945), which deal with the use of ground water for irrigation in parts of the area in Colorado, have been of particular value in the current study. A bulletin covering the geology and ground-water resources of parts of Lincoln, Elbert, and El Paso Counties, Colo., by McLaughlin (1946) treats comparable ground-water problems in similar geologic units.

METHODS OF STUDY

The investigation was started in April 1947 under the general supervision of A. N. Sayre, chief of the Division of Ground Water (now called the Ground Water Branch) of the U. S. Geological Survey, and of G. H. Taylor, regional engineer in charge of ground-water investigations in the Missouri River basin, and under the immediate supervision of S. W. Lohman, district geologist, Denver, Colo. A field office, staffed by L. J. Bjorklund, engineer, and R. T. Littleton, geologist, was established at Fort Morgan, Colo. N. M. MacNeill was employed in June 1947 to assist in the engineering work. H. F. Haworth, geologist, was detailed to the project in July. J. A. Tavelli, geologist, succeeded Mr. Haworth in November 1947 and he in turn was succeeded in September 1948 by R. F. Brown, geologist. H. M. Babcock, district engineer, Cheyenne, Wyo., critically reviewed the report and supervised its final compilation.

The quality-of-water studies were under the general direction of S. K. Love, chief of the Quality of Water Branch of the U. S. Geological Survey, and under the immediate supervision of P. C. Benedict, regional engineer in charge of the quality-of-water investigations in the Missouri River basin. Analyses of water samples were made in the laboratory of the U. S. Geological Survey at Lincoln, Nebr.

A network of 189 observation wells was established early in the investigation. This included 62 wells in the Colorado part of the area in which water levels formerly were measured by W. E. Code of the Colorado Agricultural Experiment Station, Colorado State College, Fort Collins, Colo., and 18 wells in the Nebraska part of the area in which water levels had been measured by the Lincoln, Nebr., office of the U. S. Geological Survey. Water levels were measured monthly from the beginning of the investigation through June 1949 and bimonthly thereafter through December 1950. In addition, 4 wells in Morgan County, Colo., were equipped with water-stage recording gages. Additional records were obtained from recording gages in Morgan and Weld Counties, Colo., and from 2 recording gages in Keith County, Nebr.; the former were operated by Mr. Code and the latter were operated by W. A. Doolittle of the Platte Valley Public Power and Irrigation District. Water-level records for 161 wells in Colorado and 28 wells in Nebraska are given in appendix C.

Records were obtained of 1,767 wells in the area, including 1,266 wells of large discharge used for irrigation, public supply, or industry, and 436 wells of small discharge used for domestic or stock supply, and 65 unused wells. Well owners, users, and drillers were interviewed in order to obtain pertinent information about the wells and about the nature and thickness of the water-bearing formations that are tapped by the wells. All available logs of wells were collected. An attempt was made to include all wells of large discharge in the inventory. Well records previously obtained in Colorado by W. E. Code and in Nebraska by L. K. Wenzel and H. A. Waite were studied and the wells were revisited. The location of wells was determined by automobile odometer measurements from nearby section corners or other landmarks. A summary of the inventoried wells is shown below. Measurements of the depth to water and total depth of wells were made with a steel tape, and measurements of pump yields were made with a Hoff current meter. These measurements and other pertinent information about the wells are included in appendix C at the end of this report. Reported data are listed for those wells that could not be measured.

Number of wells, according to pertinent data, included in the inventory of the lower South Platte River valley between Hardin, Colo., and Paxton, Nebr.

State and County	Number of wells				
	Use of water			Water level measured	Altitude established by spirit leveling
	Irrigation, public-supply, and industrial	Domestic, stock, and others	Total wells		
Colorado:					
Adams	34	5	39	34	27
Logan	164	123	287	226	237
Morgan	585	208	793	643	644
Sedwick	56	44	100	82	89
Washington	33	14	47	32	40
Weld	162	41	203	159	164
Nebraska:					
Deuel	77	16	93	74	76
Keith	155	50	205	160	171
Total	1, 266	501	1, 767	1, 410	1, 448

A study of the geologic formations in the area, with emphasis on the Quaternary water-bearing materials, was carried on successively by geologists Littleton, Haworth, Tavelli, and Brown. Aerial photographs and State highway maps were used in mapping the formations. The drilling of 226 test holes (total footage, 27, 749) was supervised by geologists of the U. S. Geological Survey who also logged the test holes. (See table on p. 8.) Logs of 640 wells were collected from well drillers, farmers, and land owners and a careful selection was made for inclusion in this report. An additional 375 logs of seismograph shot holes were collected; these included surface and bedrock altitudes. Information from the logs of these test holes, wells, and seismograph shot holes was used in drawing on plate 1 the lines showing the contour of the pre-Quaternary surface.

Test drilling in the project area supervised and logged by geologists of the U. S. Geological Survey

Driller	Year	Supervisor	Number of holes	Feet of drilling
Canfield Drilling Co., Fort Morgan, Colo. Contract with U. S. Geol. Survey.	1947	H. F. Haworth	55	5,000
Do	1948	J. A. Tavelli	54	4,820
Canfield Drilling Co., Fort Morgan, Colo. Contract with town of Julesburg, Colo.	1948	T. G. McLaughlin	8	860
Ellithorpe and Putman, Ogallala, Nebr. Contract with U. S. Geol. Survey.	1949	R. F. Brown	55	5,774
Conservation and Survey Division of the University of Nebraska. Cooperative arrangement with U. S. Geol. Survey.	1949	J. L. Deffenbaugh	39	9,739
Adams Well Works, Brush, Colo. Contract with town of Brush, Colo.	1949	R. F. Brown	15	1,556
Total			226	27,749

The altitude of the measuring point of 1,448 wells and of the land surface at 226 test holes was established by F. E. Busch, R. L. Morgan, and L. R. Reed. Temporary bench marks were set at or near section corners to aid future leveling work.

Samples of water were collected from 123 wells and chemical analyses of the samples were made in the laboratory of the U. S. Geological Survey at Lincoln, Nebr.

Pumping tests were made at six sites to determine the hydrologic properties of the water-bearing materials. Two of these tests were made in cooperation with the U. S. Bureau of Reclamation to determine the possibility of seepage at proposed dam sites.

Detailed studies were made in the vicinity of Julesburg and of Brush, Colo. Two reports, one by T. G. McLaughlin (1948) and the other by R. F. Brown (1950), were prepared by the U. S. Geological Survey and published by the Colorado Water Conservation Board. Data collected during those studies are included in this report.

WELL-NUMBERING SYSTEM

Well numbers in this report are based on the Bureau of Land Management's system of land subdivision. The well number shows the location of the well by township, range, section, and position within the section. A graphical illustration of this method of well numbering is shown in figure 3. The first letter (capital) of a well

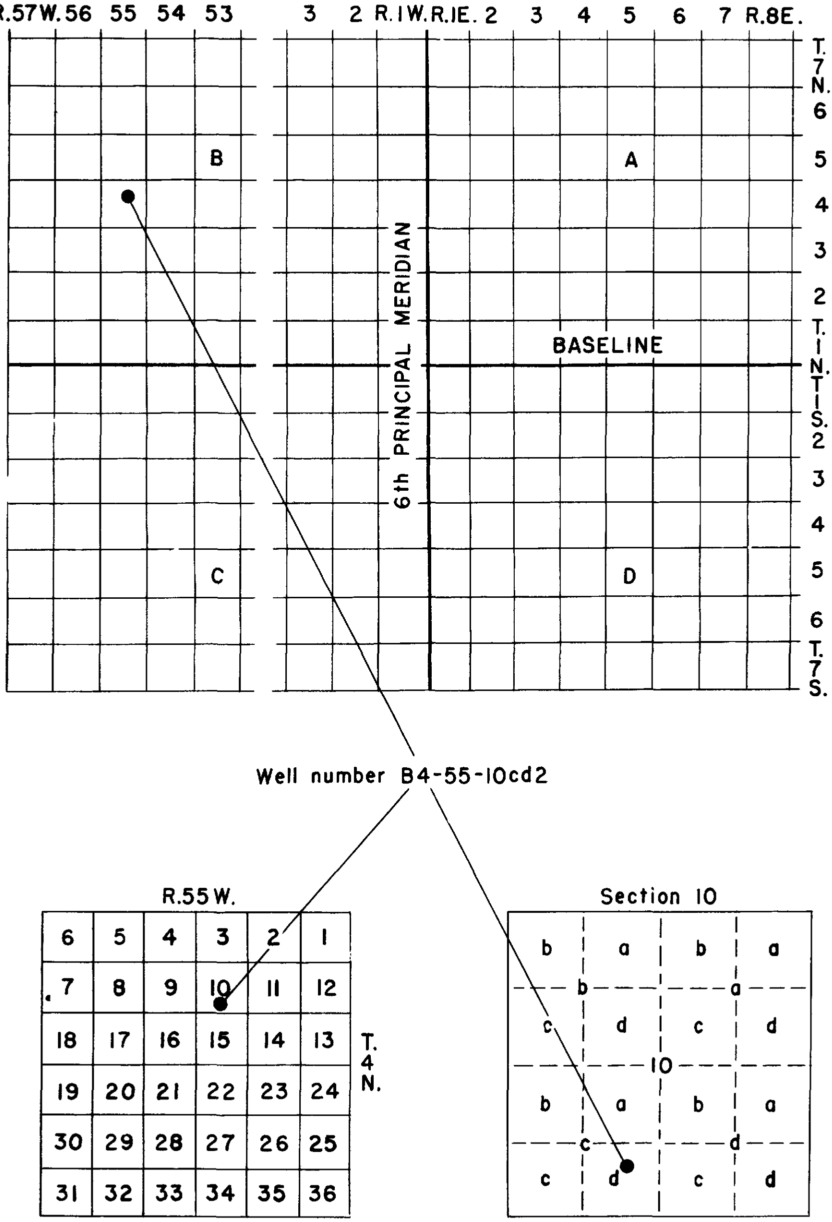

Figure 3. — Well-numbering system.

number gives the quadrant of the meridian and baseline system in which the well is located; the quadrants are lettered beginning in the northeast quadrant (with A) and proceeding counterclockwise. All wells in this area lie in the northwest (B) or southwest (C) quadrants of the sixth principal meridian and baseline system. 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 lowercase letters following the section number locate the well within the section. The first letter denotes the quarter section, and the second letter the quarter-quarter section. The letters are assigned in a counterclockwise direction beginning with (a) in the northeast quarter of the section or of the quarter-quarter section. If more than one well is in a quarter-quarter section consecutive numbers, beginning with 1, are added to the well numbers. For example, the well number B1-55-30bd indicates a location in the southeast quarter of the northwest quarter of sec. 30, T. 1 N., R. 55 W.

ACKNOWLEDGMENTS

Many residents in the area gave information about their wells and permitted measurements to be made in their wells. Information regarding public-supply wells was given by city and town officials of Fort Morgan, Brush, Merino, Sterling, Iliff, Crook, Sedgwick, Ovid, and Julesburg, Colo., and Big Springs, Ogallala, and Paxton, Nebr. W. E. Code of the Colorado Agricultural Experiment Station, Colorado State College, Fort Collins, Colo., made data available from his previous ground-water investigations within the area. Appreciation is expressed to personnel of the U. S. Bureau of Reclamation for their cooperation in supplying engineering data. H. W. Bigler, president, M. M. Wilson, manager, and other members of the board of the Morgan County Rural Electric Association supplied free power for pumping tests and furnished power data of irrigation pumps. Well drillers or drilling companies (including Canfield Drilling Co., Fort Morgan, Colo.; Adams Well Works, Brush, Colo.; Seth Harshman, Wiggins, Colo.; Oliver Well Works, Greeley, Colo.; Holden and Holden, Hudson, Colo.; A. E. Crandall and sons, Hoyt, Colo.; Ellithorpe & Putman, Ogallala, Nebr.; Haggard Drilling Co., Ogallala, Nebr.; John Linglebach, Ogallala, Nebr.; Stewart Drilling Co., Sterling, Colo.; and Sharp Drillers, Sidney, Nebr.) contributed logs of wells and test holes and supplied general information regarding depths to water and bedrock. E. C. Reed. J. L. Deffenbaugh. and V. H. Dreeszen of the Conservation and Survey Division of the University of Nebraska gave valuable advice and assistance in connection with the geologic investigation in Deuel and Keith Counties, Nebr.

GEOGRAPHY

TOPOGRAPHY AND DRAINAGE

The area covered by this investigation lies entirely within the lower valley of the South Platte River and is drained by that stream and its tributaries. The valley lies in the Denver basin region of the Colorado Piedmont and High Plains sections of the Great Plains physiographic province.

The altitude of the highest part of the area, in the vicinity of Prospect Valley, Colo., is about 5,000 feet, and that of the lowest point, at Paxton, Nebr., is 3,057 feet; the total relief, therefore, is about 2,000 feet.

The river is about 1,500 feet lower than the South Platte-Arkansas divide, to the south, and more than 1,000 feet lower than the South Platte-North Platte divide in Wyoming. In the divide areas, the Tertiary rocks are still intact. The surface between the divide areas, which is essentially in the old age stage of the erosion cycle, is formed, for the most part, on the uniformly weak Pierre shale with promontories that are capped by the more resistant Fox Hills sandstone and the rocks of the White River group. Downstream from Sedgwick, Colo., the Tertiary rocks crop out in belts parallel to the river and form a broad, flat, upland plain, which is broken only by short, steep, tributary valleys.

Six terrace surfaces are present in many places in the South Platte River valley, and at least two pediment surfaces lie above the terraces (Bryan and Ray, 1940). Three distinct stages of downcutting by streams into the underlying bedrock are shown on the cross sections (pl. 2, sections O, P, Q, R). These successive stages of downcutting are reflected imperfectly in the major tributary drainages. The South Platte River, which is a throughflowing stream from mountains that are in a region of high precipitation, caused more rapid erosion than its tributaries which originate on the plains. Because little rain falls on the plains and because the Tertiary mantle is highly permeable, erosion has been extensive only where gradients were steep, as in Beaver and Bijou Creeks. Tributary drainages, therefore, did not adjust completely to each change in grade of the South Platte River.

The South Platte River is a consequent stream that resulted from the uplift of the Rocky Mountains, and its gradient is comparatively uniform. (See fig. 2B.) Tributary streams west of the Morgan County line may be in part subsequent—that is, the upturned edges of the underlying Cretaceous sediments may have determined the course of the streams. Drainage throughout the

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remainder of the area covered by this investigation is typically dendritic.

The South Platte River and Lodgepole Creek are perennial throughout the area, although their flow is subject to marked seasonal variation. The remaining stream valleys have a continuous underflow, but surface runoff occurs only after precipitation.

CLIMATE

The area considered in this report is semiarid and has an average annual rainfall of about 16 inches. This precipitation is insufficient for many kinds of crops but, when uniformly distributed throughout the growing season, it will support grasses and some grains. Most of the summer rainfall results from thundershowers but, owing to the erratic distribution of the showers, each year some areas have extended rainless periods. For these reasons, irrigation has become an increasingly important part of the agricultural economy of the lower South Platte River valley.

The average climatic data for five stations in the lower South Platte River valley are given in table 1, and the annual precipitation and cumulative departure from normal precipitation at Fort Morgan, Colo., are shown in figure 4. The prevailing direction of the wind throughout the area is from north to northwest during the winter and from south to southeast during the summer. Wind velocities are highest during the spring and diminish to a minimum in late summer. In the eastern part of the lower South Platte River valley, tornadoes sometimes cause local damage to crops; however, the most severe weather damage to crops results from hail.

Table 1.—*Average climatic data for five stations in the lower South Platte River valley*

[Data from records of the U. S. Weather Bureau]

Station	Annual precipitation (inches)	Temperature (degrees Fahrenheit)				Length of growing season (days)
		Maximum	Minimum	Average July	Average January	
Colorado:						
Greeley, Weld County..........	12.60	107	-45	72.2	24.9	148
Fort Morgan, Morgan County..	13.43	109	-36	72.8	23.5	145
Sterling, Logan County.........	15.15	105	-33	72.4	23.8	146
Julesburg, Sedgwick County....	17.14	108	-38	74.7	25.4	140
Nebraska:						
Ogallala, Keith County........	19.49	111	-29	77.0	24.6	150

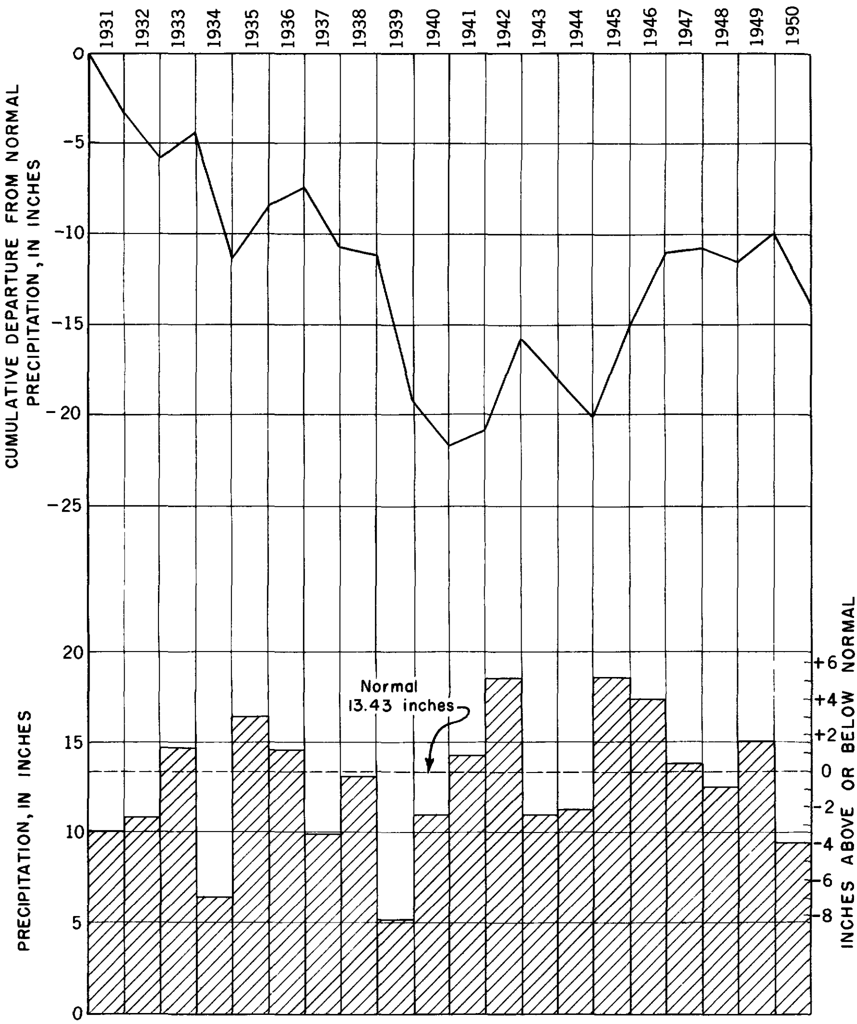

Figure 4.—Annual precipitation and cumulative departure from normal precipitation at Fort Morgan, Colo., 1931-50.

AGRICULTURE AND POPULATION

The limits of the area covered by the investigation are arbitrarily defined and do not conform to established geographical boundaries. For this reason, statistics relative to agriculture and population within the limits of the area are not readily available; hence, the figures presented are estimates, based on data for entire counties for the years 1939-47. The amount of irrigated land has increased appreciably since 1939.

Eighty-five percent of Morgan County, Colo., is included within the area of study. Because the remaining 15 percent is sparsely populated and is not irrigated, the total county statistics are used. The types of crops produced in Morgan County (see table below)

Acreage of dry and irrigated crops in Morgan County, Colo., 1947

[Data supplied by Jack French, County Agent for Morgan County]

Crop	Acreage cultivated		Crop	Acreage cultivated	
	Irrigated	Dry		Irrigated	Dry
Corn	31,000	0	Oats	2,500	2,500
Beets	25,000	0	Potatoes	2,400	0
Alfalfa	20,000	0	Forage crops	500	425,000
Barley	18,000	18,000	Sorghum	0	17,500
Beans	16,000	0	Rye	0	5,000
Wheat	5,000	51,000			
Vegetables	5,000	0	Total	125,400	519,000

are representative of those that are produced throughout the lower South Platte River valley. To obtain a comparison between Morgan County and other counties in the lower South Platte River valley, estimates were made (see table below) from data given in Year Book of the State of Colorado for 1939-40; the population and cultivated acreage were apportioned according to the percentage

Estimated population and cultivated acreage of the lower South Platte River valley, by counties, 1939–40

County	Area, in square miles		Population	Acreage cultivated	
	Total	Part included in investigation		Irrigated	Dry
Colorado:					
Weld	4,020	590	8,700	40,000	400,000
Morgan	1,285	1,098	17,180	70,000	600,000
Washington	2,520	20	500	5,000	3,000
Logan	1,820	800	8,000	75,000	450,000
Sedgwick	530	324	4,000	19,000	180,000
Nebraska:					
Deuel	440	250	4,000	10,000	100,000
Keith	1,085	400	3,000	20,000	150,000
Total	11,700	3,482	45,380	239,000	1,883,000

of the county included in the area. Population estimates may be considerably in error, as they are based on the assumption that the population is evenly distributed throughout the counties.

INDUSTRY

The major industries in the area are those that process agricultural products. Sugar refineries are located in Ovid, Sterling, Brush, and Fort Morgan, Colo., and grain mills are located in many of the cities. Small manufacturing concerns operate in several of the cities.

TRANSPORTATION

The area is served by two major railroads. The main line of the Chicago, Burlington & Quincy Railroad crosses the southern part of the area through Brush, Fort Morgan, Wiggins, and Roggen, Colo., and a branch line of this railroad extends north from the main line at Brush, Colo. The main line of the Union Pacific Railroad parallels the South Platte River from Paxton, Nebr., west to Julesburg, Colo., then turns northward and parallels Lodgepole Creek. A branch line of the Union Pacific Railroad parallels the South Platte River from Julesburg, Colo., west to beyond the edge of the project area. Short branch lines of both railroads serve as sugar-beet collection points throughout the area.

U. S. Highways 6, 34, 138, and 30 traverse parts of the area, and several State highways and graded county roads connect with the U. S. highways.

GEOLOGY

The rocks that crop out in the lower South Platte River area are sedimentary and range in age from Late Cretaceous to Recent. The areas of outcrop of these formations are shown on plate 1. The oldest rocks, which are of Late Cretaceous age, are the Pierre shale, the Fox Hills sandstone, and the Laramie formation. Tertiary rocks in the area include the Chadron, Brule, and Ogallala formations. Most of the major valleys contain Quaternary deposits of alluvium, terrace deposits, and dune sand.

A generalized section of the geologic formations that are exposed in the area is given on page 16. A brief account of the geologic history of the area and descriptions of the geologic formations and their water-bearing properties are given on the following pages.

Generalized section of the geologic formations exposed in the lower South Platte River valley

System	Series	Subdivision	Thickness (feet)	Physical character	Water supply
Quaternary	Pleistocene and Recent	Dune sand	0-100	Sand, silt, and clay; compacted slightly.	Lies mostly above water table and yields only small supply of water locally, but serves as an infiltration area for recharge.
		Unconformity			
		Alluvium	0-293+	Gravel, sand, silt, and clay; unconsolidated, lenticular.	Supplies large quantites of water to irrigation wells and public-supply wells throughout the lower South Platte River valley.
		Unconformity			
Tertiary	Pliocene	Ogallala formation	0-350+	Gravel, sand, silt, and clay beds interlayered with hard calcareous sandstone and limestone (caliche).	An important source of water in Keith and Deuel Counties, Nebr. Yields large quantities of water to irrigation wells.
		Unconformity			
	Oligocene	White River group: Brule formation	0-500+	Silt, containing fine sand and clay, light tan to pink; contains channel deposits of gravel and sand.	Generally not a good aquifer, but yields a moderate supply locally from porous and jointed zones.
		White River group: Chadron formation	0-102+	Pink, blue, and green clay and channel deposits.	Small quantities of water may be available locally from channel deposits.
		Unconformity			
Cretaceous	Upper Cretaceous	Laramie formation	0-200+	Sandy clay, shale, and sandstone; carbonaceous; contains coal.	Yields moderate quantities of water to stock and domestic wells.
		Fox Hills sandstone	0-200	Largely grayish-brown shaly sandstone and beds of massive white sandstone; contains large concretions.	Yields water under artesian pressure to domestic and stock wells; locally supplies springs.
		Pierre shale	2,500-6,500	Dark shale and silt. Contains a few large limestone concretions and sandstone lenses throughout.	Yields moderate quantities of water to stock and domestic wells in some areas.

GEOLOGIC HISTORY

The oldest formation exposed in the area is the Pierre shale of Late Cretaceous age. Rocks of Paleozoic age and of Mesozoic age that are older than the Pierre shale do not crop out in the portion of the South Platte River valley included in this study, but they are exposed along the east front of the Rocky Mountains about 50 miles west of the area. Statements concerning the possible presence of these rocks beneath the area are based in part on observations made where the rocks crop out and in part upon data from several deep oil tests that were drilled in and near the area. The following discussion of Paleozoic and Mesozoic history is adapted from a report by McLaughlin (1946, p. 21-24) of a nearby area of similar lithology and is applicable to this report.

PALEOZOIC ERA

The Paleozoic history of the region began with the erosion of the pre-Cambrian basement rocks that lie beneath the Paleozoic sediments in this region. After the long period of erosion, thick deposits of marine limestone and shale were laid down by shallow seas that covered the area. The seas withdrew in later Paleozoic time and a thick sequence of red beds was laid down in an arid region, as is indicated by the deposits of evaporites such as anhydrite and gypsum.

MESOZOIC ERA

Arid conditions continued in this region during the first part of the Mesozoic era, as indicated by the Triassic red beds exposed along the eastern border of the Colorado Front Range.

During the Jurassic period the shale and sandstone of the Morrison formation were laid down by streams. The continental origin of this formation is shown by the abundance of fossil remains of dinosaurs and other land animals in these deposits in the Rocky Mountain region.

The Cretaceous period began with erosion, which lasted until near the end of Early Cretaceous time. The sandstone in the lower part of the Purgatoire formation was then deposited in this area either by shallow seas or by streams (Twenhofel, 1924, p. 19). A sea then covered the area and deposited the Kiowa shale member of the Purgatoire formation. The overlying Dakota sandstone, which marks the top of the Lower Cretaceous series and the bottom of the Upper Cretaceous series, was laid down under conditions similar to those during early Purgatoire time; that is, the sea retreated and continental deposits of sand and clay were laid down.

During much of Late Cretaceous time there were widespread invasions of the sea, which deposited several thousand feet of marine shale, chalk, limestone, and sandstone that constitute the the Graneros shale, Greenhorn limestone, Carlile shale, Niobrara shale, Pierre shale, and Fox Hills sandstone. Near the close of the Cretaceous period the area now occupied by the Rocky Mountains began to rise, the sea withdrew, and the sandstone, shale, and coal of the Laramie formation and lower part of the Dawson arkose were deposited mainly by streams but probably in part under nearshore conditions. The rise of the Rocky Mountains created increased gradients in the streams, causing deposition of beds of sandstone that now constitute the principal water-bearing deposits in these formations.

CENOZOIC ERA

Early Tertiary time was a period of uplift and severe erosion and during this time a great thickness of Cretaceous sediments, including most of the Laramie and Fox Hills formations, was removed from the area. This was followed by several periods of deposition. From Oligocene through Pliocene time, considerable clastic material, which was derived from the Rocky Mountains to the west, was laid down by streams or in lakes. The White River group, composed of the Chadron and Brule formations, consists of thick clay and silt deposited in many shallow lakes and of channel sand deposited by streams of slight to moderate declivity. Stream gradients gradually steepened until the end of Pliocene time. The increase in grain size toward the top of the Ogallala formation reflects this change in grade. The lenticular character of the materials in the Ogallala formation indicates that they were deposited by braided streams.

The multiple glaciations in the Rocky Mountains during the Pleistocene epoch were reflected in the South Platte River valley by successive stages of degradation and aggradation. During the early part of this epoch, the South Platte River and its large tributaries incised deep channels, which nearly conform to present drainage patterns. However, these pre-Quaternary channels, for the most part, are much straighter than the present stream channels, probably because the rapid downcutting of the streams prevented lateral erosion. However, at the mouth of both Bijou and Lodgepole Creeks, the river apparently has occupied several channels. The approximate location, size, and areal extent of these pre-Quaternary channels are shown on plate 1 by contour lines drawn on the pre-Quaternary surface. The locations of the contours are based on depths to the pre-Quaternary formations obtained from logs of test holes and wells (appendix B) and on information obtained from well owners (appendix C). Twenty-five geologic cross sections were constructed to show the shape of these channels. These cross sections and their location in the project area are shown on plate 2.

The pre-Quaternary channels were filled to a depth of as much as 500 feet. Later Pleistocene glaciations caused more cycles of erosion and aggradation, which resulted in six terraces representing six levels to which the river was aggraded. Each of these terrace levels has been correlated with a substage of the Wisconsin glaciation (Bryan and Ray, 1940, p. 48). At the present time, the South Platte River is flowing nearly at grade—that is, erosion and deposition are approximately equal; however, the tributaries are not yet completely adjusted to the South Platte River and still are actively eroding.

The large deposits of dune sand and loess within the area were deposited mainly during late Pleistocene time, although in places the dunes are actively migrating. These eolian deposits were derived from the wide flood plains of the South Platte River and its larger tributaries and from deflation of the Ogallala and Laramie formations, the Fox Hills sandstone, and the Pierre shale. The prevailing winds probably were from the northwest, as shown by the alinement and topography of the dunes, and caused local southeastward migration of dune sand over terrace deposits.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

CRETACEOUS SYSTEM

PIERRE SHALE

Character and thickness.—The Pierre shale consists of bluish-black marine shale and silt and interbedded tan to yellowish-brown sand and sandy shale in the upper part, or transition zone. Many beds of bentonite and large bluish-gray limestone concretions are present throughout the formation. Some sandy beds in the transition zone are partially cemented by calcium carbonate. Weathering and contact with the highly calcareous rocks that overlie the Pierre shale in most of this area have altered the color of the upper part of the formation to yellowish brown (Rankin, 1930, p. 112). Many test holes in the Pierre shale were drilled through several feet of yellowish-brown shale before reaching bluish-black shale. Most of the Pierre shale is of uniform lithology. In the vicinity of Fort Morgan, Colo., the upper 2,600 feet of the Pierre shale consists of gray to bluish-black slightly silty and sandy clay shale that contains thin lenses of sand. From 2,600 to 4,100 feet below the top of the formation is the Hygiene sandstone member of the Pierre shale which consists of white to light-gray or light-brown angular to subangular slightly calcareous sand interbedded with dark-gray sandy calcareous shale. Underlying the Hygiene sandstone member is an additional 980 feet of dark shale (Blair, 1951).

The thickness of the Pierre shale in the area ranges from an estimated 6,500 feet near Hardin, Colo., to 2,500 feet near Paxton, Nebr.

Distribution and surface form.— The Pierre shale underlies most of eastern Colorado, northwestern Kansas, Nebraska, South Dakota, and North Dakota, and parts of New Mexico, Wyoming, Montana, and Minnesota. It underlies the entire area covered by this report but crops out only in Morgan County and in Logan County on the north side of the South Platte River as far east as Illif. Because it lacks resistant beds the Pierre shale erodes, for the most part, into gentle slopes, which generally are overlain by thin deposits of loess. Good exposures are found only where severe gullying has taken place or in excavations.

Age and correlation.—The Pierre shale is of Late Cretaceous age and rests conformably on the Niobrara formation. It grades upward into the Fox Hills sandstone in western and northern Morgan County. East of Morgan County, in eastern Colorado and Nebraska, the Chadron formation, which is the lower unit of the White River group of Tertiary age, rests uncomformably on the Pierre shale. The contacts between the Pierre shale and those formations overlying it enclose an area that is approximately diamond shaped. One apex lies near Masters, Colo., and the opposite apex lies between Proctor and Iliff, Colo. The Fox Hills sandstone borders the west half of the diamond and the Chadron formation borders the east half.

Water supply.—The Pierre shale is usually considered to be a poor source of water. In some areas, however, artesian water may be obtained from lenses of sand within the shale. These lenses do not seem to follow any pattern as to either depth or areal extent, although wells obtaining water from the Pierre shale are most numerous in the vicinity of Sterling, Colo., where the water is found at depths ranging from 250 to 350 feet. Wells obtaining water from these lenses usually do not produce more than 10 gpm (gallons per minute) and larger quantities cannot be expected. The artesian pressure in the wells near Sterling has steadily declined; here, as in other places (McLaughlin, 1946, p. 77), part of the small amount of water in storage is discharged by pumping, and is recharged only very slowly. Recharge by infiltration of surface water is negligible, because pore spaces between the grains of clay, silt, and very fine sand in the Pierre shale are very minute.

Sand lenses deep in the Pierre shale, such as the Hygiene sandstone member, might yield small quantities of water, but the cost of deep drilling and the likelihood that the water would be too highly mineralized for domestic use eliminate these lower lenses as a source of water at this time. No water wells are known to have been drilled into the sands.

Water in quantities sufficient for irrigation, public-supply, or industrial use is not available from the Pierre shale. Except for the localized sand lenses and the deep-lying Hygiene sandstone member, the Pierre shale is relatively impermeable and little or water can be obtained from it. Many stock wells are drilled into the Pierre shale where it is overlain by permeable dune sand. The water from the overlying deposits is too small in quantity to be pumped from the sand, but it flows into the hole drilled in the shale, which serves as a reservoir. This water then is pumped from the reservoir when needed.

Because the Pierre shale is so thick throughout the area, drilling to aquifers below it is not considered practicable. Moreover, oil-well tests indicate that water in the formations beneath the Pierre shale is saline and therefore not suitable for general use.

FOX HILLS SANDSTONE

Character and thickness.—The Fox Hills sandstone consists predominantly of medium-grained buff to yellowish-brown poorly consolidated calcareous sandstone interbedded with dark-gray to black gritty shale and some massive white sandstone. Lovering and others (1932, p. 702-703) state—

> The base of the Fox Hills shall be considered as the horizon below which the section is predominantly gray marine shales and sandy shales of Pierre age, and above which the section changes rapidly to a buff to brown sandstone containing numerous large gray to brown hard, sandy concretions. This lower concretionary member is commonly overlain by a series of light gray to brown sandstones and sandy shales.

The lower part of the formation is well exposed in sec. 3, T. 5 N., R. 60 W., where it consists of sandy shale interbedded with sandstone. The upper boundary of the Fox Hills sandstone is distinguished by a large number of poorly consolidated calcareous sandstone beds. Lovering and others (1932) state—

> The top of the Fox Hills formation shall be considered as the horizon above which the section is composed predominantly of fresh and brackish water deposits accompanied by coals and lignitic shales, and below which it is predominantly marine.

The formation ranges in thickness from a featheredge to nearly 200 feet in the area covered by this investigation.

Distribution and surface form.—The Fox Hills sandstone underlies parts of Wyoming, Colorado, Nebraska, and South Dakota. Within the area described by this report, it underlies parts of Weld and Morgan Counties, Colo. It crops out in Weld County on both sides of the South Platte Valley and is well exposed north of the South Platte River in Morgan County. The formation dips westward at the rate of about 6 feet to the mile and then rises abruptly and crops out in the foothills east of the Front Range. Its extent eastward is shown by the line of contact of the Fox Hills sandstone and Pierre formation on plate 1.

In most exposures, the formation is eroded into gently rounded slopes characterized by isolated mounds capped by resistant concretions. In northwestern Morgan County the more resistant beds form a protective capping on a line of promontories, a striking topographic feature in this part of the area. On the south side of the river in Morgan and Weld Counties the Fox Hills sandstone is mantled by deposits of Pleistocene gravel and eolian material; its areal extent in this area was determined by test drilling.

Age and correlation.—The Fox Hills sandstone of Late Cretaceous age conformably overlies the Pierre shale and is conformable with the overlying Laramie formation. Both upper and lower boundaries are indefinite. In northeastern Morgan County the Chadron formation unconformably overlies the Fox Hills sandstone in small areas where the Laramie formation is absent.

The Fox Hills sandstone in northwestern Morgan County has been correlated (Mather, Gilluly, and Lusk, 1928, p. 93-99) with outcrops of the Fox Hills sandstone in the foothills along the Front Range; fossils have been found in the latter locality.

Water supply.—The Fox Hills sandstone yields small quantities of water to stock and domestic wells and to springs. No known efforts have been made to obtain large quantities of water from the formation in this area; however, at Denver, Colo., and in the vicinity of Deer Trail, Colo., wells in the Fox Hills sandstone are reported to produce as much as several hundred gallons per minute.

Water enters the Fox Hills sandstone largely in the region of the foothills east of the Front Range. Eastward from the foothills, the water is confined between the relatively impermeable Pierre shale and Laramie formation. In the parts of this area that are underlain by the Fox Hills sandstone, the water is under hydrostatic head and rises above the level at which it is first reached in wells. Well B2-62-6ca, in Weld County, flows 1.3 gpm from the Fox Hills sandstone. This well has flowed continuously for 30 years. It is probable that other flowing wells could be developed in the Fox Hills sandstone on low ground.

Within the outcrop area (pl. 1, sheets 1 and 2), water may be obtained at relatively shallow depths. Westward, the depth of wells in the Fox Hills sandstone increases sharply with the progressive thickening of the overlying Laramie formation.

LARAMIE FORMATION

Character and thickness.—The Laramie formation consists of gray to yellowish-brown sand, dark clay and shale, and coal, interstratified with irregularly bedded gray to cream or buff sandstone. Concretions composed of limonitic and calcareous materials also are present. The clay generally is poorly bedded, is gray to bluish gray, and contains carbonaceous material, especially in the lower part of the formation. The shale is thinly laminated, is usually gray to bluish gray, and in places is highly carbonaceous. The beds of coal and sandstone are most abundant in the lower part of the formation. The coal is lignitic, usually in beds 1 to 2 feet thick. The interbedded sand and sandstone range from partially indurated material to quartzitic sandstone. The lower part of the formation was deposited in shallow brackish water; the upper part is largely terrestrial. Thin beds in the lower part of the formation contain mollusca.

The thickness of the Laramie formation ranges from a featheredge to nearly 200 feet within the area described by this report but probably reaches 1,000 feet west of this area.

Distribution and surface form.—The Laramie formation underlies most of northeastern Colorado east of the Front Range; its area of distribution is similar to that of the Fox Hills sandstone although it is slightly smaller. Like the Fox Hills sandstone, the Laramie formation crops out at the foothills near the Front Range, where its dip is toward the east. Eastward from the mountains, its dip is reversed, and at the west edge of the mapped area, its dip is about 6 feet to the mile toward the west.

The Laramie formation is poorly exposed in the area covered by this report. Thin remnants occur in northern Morgan County and north of Riverside Reservoir in Weld County. The formation underlies the divide between Bijou and Kiowa Creeks near the south edge of the area and forms the divide between Kiowa and Lost Creeks. It also underlies most of the Prospect Valley area and most of the areas west of R. 62 W. that was included in this investigation. in the divide areas, as well as in the Prospect Valley area, the formation is covered with eolian deposits and thick gravel deposits. The only known exposure of the Laramie formation south of the South Platte River is in the northwest corner of sec. 9, T. 1 N., R. 60 W. The exposure, dark-gray shale interbedded with beds of carbonaceous material, represents the lower part of the Laramie formation; in the creek bottom poorly cemented light-gray sandstone below the shale probably is the Fox Hills sandstone.

The Laramie formation consists predominantly of nonresistant rocks that weather to smooth, rounded slopes which have a moderately good soil cover. Eolian deposits mantling this surface have modified the slight initial relief.

Age and correlation.— The Laramie formation of Late Cretaceous age conformably overlies the Fox Hills sandstone and, in the area described by this report, is overlain unconformably by Pleistocene and Recent sediments. The formation has been traced directly to the Front Range; fossils collected from that area and from northern Morgan County have been described (Mather, Gilluly, and Lusk, 1928, p. 100). The term Laramie formation is assigned by the U. S. Geological Survey only to beds of Laramie age in the Denver basin region, although beds of equivalent age are distributed widely in the Rocky Mountain and Great Plains regions.

Water supply.—Because the Laramie formation is overlain by saturated eolian or alluvial material, it generally is not necessary to drill into it to obtain water. As only two wells in this area derive water from it, little is known about the depth to or the quality and quantity of the water in this aquifer. The Laramie formation dips about as much and in about the same direction as the Fox Hills sandstone—that is, in the foothills east of the Front Range the Laramie formation dips steeply eastward, then reverses and rises gently toward the east. The water-bearing beds in the Laramie formation contain water under artesian pressure where they are overlain and underlain by impermeable beds. However, the water was not under sufficient hydrostatic pressure to flow at the surface in any wells in the area covered by this investigation. According to McLaughlin (1946, p. 81), most of the water-bearing beds are in the lower part of the formation.

TERTIARY SYSTEM

OLIGOCENE SERIES—WHITE RIVER GROUP

The White River group of Oligocene age consists of two formations—the Chadron and the Brule. Because of similarity in lithology and because of poor exposures, the two formations have not been differentiated on the geologic map (pl. 1). The Brule and Chadron formations were identified in most of the test holes that were drilled into the White River group. Much of the discussion that follows is based on the logs of these test holes.

The White River group (White River formation where the Chadron and Brule cannot be distinguished) underlies parts of Nebraska, South Dakota, North Dakota, Montana, Wyoming, and Colorado. Because the eastward dip of the White River group is greater than the gradient of the South Platte River, the area enclosed by the contact between the White River group and the underlying Pierre shale and between the White River group and the overlying Ogallala formation is roughly V-shaped with the apex downstream. South of the river, these contacts are mantled by dune-sand deposits, but north of the river they are well exposed locally.

CHADRON FORMATION

The Chadron formation consists predominantly of pink and blue blocky clay, which, near the upper boundary of the formation, grades upward into light greenish-gray and light-gray clay with increasing quantities of silt. Near the contact with the underlying Pierre shale in sec. 36, T. 8 N., R. 55 W., the Chadron formation consists of white to light-gray silty clay that is overlain by medium-grained to very coarse grained siliceous sandstone. In other places, the pink and blue clay lies directly on the Pierre shale. A mechanical analysis of a clay sample from the Chadron formation showed that it is a well-sorted deposit containing less than 20 percent by weight of silt and coarser particles, and a microscopic examination revealed that it consisted almost wholly of decomposed volcanic ash (Wenzel, Cady, and Waite, 1946, p. 61). The Chadron formation contains many channel deposits of sand and gravel, which are present at all horizons within the formation but are more abundant near its upper and lower boundaries. They range widely in lithology but consist chiefly of coarse to very coarse sand and very fine to medium gravel. They generally are well indurated with a siliceous cement.

The top of the Pierre shale on which the Chadron formation rests and the top of the Chadron formation are both erosional surfaces; as a result, there is wide range in the thickness of the formation. It is 102 feet thick north of Proctor where test holes for the U. S. Geological Survey were drilled through it, but elsewhere it probably is much thicker. The channel deposits of sand and gravel generally are about 20 feet thick; one such deposit is known to be about 60 feet thick.

The Chadron underlies the flood plain of the South Platte River from near Proctor, Colo., eastward to Sedgwick, Colo. Exposures are abundant north of the river from Sterling, Colo., east to Proctor, Colo. Channel deposits of the Chadron formation form resistant mounds that stand above dune-sand deposits and crop out south of the river near Proctor.

The clay in the Chadron formation weathers to smoothly rounded slopes covered with a moderately thick soil. The channel sands are very resistant to erosion and form prominent ledges above Pawnee Creek in sec. 30, T. 8 N., R. 54 W., and secs. 25 and 36, T. 8 N., R. 55 W. They are prominent as isolated mounds in many other places.

The Chadron formation is the lower unit of the White River group and is the oldest Tertiary formation that is exposed in the area. Fragments of a titanothere skeleton were collected from the channel sands in sec. 11, T. 9 N., R. 53 W., and were considered by C. Lewis Gazin to be of Chadron age. The Chadron formation was tentatively identified in Keith County, Nebr., by Wenzel and Waite (1941, p. 33-34) and was correlated with exposures in Colorado.

The Chadron formation rests unconformably on the Pierre shale within the area covered by this investigation and lithologically grades upward into the Brule formation, which is conformable with it.

The Chadron formation, so far as is known, yields no water to wells within the area described by this report. The clay is relatively impermeable and water probably could not be obtained from it; however, the channel deposits probably would yield small quantities of water to wells. Meinzer (1919, p. 63) reported that an artesian flow of 1 gpm was obtained by the city of Julesburg from a 4-inch sandstone layer that is thought to be a part of the Chadron formation. The location and extent of the channel deposits could be determined only by test drilling.

BRULE FORMATION

The Brule formation is predominantly silt but contains small quantities of clay and fine sand. The results of a mechanical analysis (Wenzel, Cady, and Waite, 1946, p. 67) of a sample of the formation collected from an exposure near Scotts Bluff Monument in Nebraska are given below.

Grain size (diameter in millimeters)	*Percent by weight*
Greater than 0.125 (coarser than very fine sand)	7.4
0.125 to 0.062 (very fine sand)	19.2
0.062 to 0.005 (silt)	69.4
Less than 0.005 (clay)	3.9

Samples from test holes drilled in the Brule formation in the South Platte River valley were of similar composition. The formation predominantly is reddish buff to tan, but in some localities the color ranges through shades of pink and red. The weathered surface generally is a very light tan but is slightly reddish where the underlying fresh surface is red to pink. Near the base, the formation contains beds of pale-green silt and locally prominent channel deposits. The latter contain sand and gravel as well as calcareous silt and clay balls derived by weathering of other parts of the formation.

The thickness of the Brule formation ranges from a featheredge to more than 500 feet. Channel deposits within the Brule formation are as much as 70 feet thick.

In the South Platte River valley the Brule formation crops out in Logan and Sedgwick Counties, Colo., and underlies parts of Sedgwick County, Colo., and Keith and Deuel Counties, Nebr. West of Sedgwick, Colo., the Brule formation has been removed from the South Platte River bottom by erosion. North of the South Platte River, the Brule formation is exposed in T. 11 N., Rs. 53 and 54 W., as a series of bluffs that rise about 200 feet above the plains.

The Brule formation is of middle to late Oligocene age. Darton (1905) correlated the Brule formation in northeastern Colorado with exposures in Wyoming and South Dakota. Wenzel and Waite (1941, p. 32-33) described exposures of the formation in Keith County, Nebr. In the area covered by this investigation, the Brule formation is underlain by the Chadron formation and is conformable with it. The Ogallala formation of Pliocene age lies unconformably on the Brule formation.

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In most places the Brule formation is relatively impermeable and wells drilled into the formation yield very little water. However, the formation fractures readily into blocky fragments, and in some areas water sufficient for stock and domestic use is obtained from the fractured zones. In eastern Wyoming and in western Nebraska, wells tapping these fractured zones yield as much as 2,000 gpm. However, in the area covered by this investigation, no wells in the Brule formation yield sufficient water for irrigation.

In the lower part of the Lodgepole Creek valley, the Brule formation contains what locally is known as the porous zone. The zone generally is 10 to 15 feet thick and, according to McLaughlin (1948, p. 13)—

. . .consists of moderately well-rounded pebbles of reworked Brule formation, the pebbles ranging in diameter from less than half an inch to more than 2 inches.

Inasmuch as the so called "porous" zone is actually a deposit of coarse gravel that is confined to the zone underlying the alluvium, it perhaps should be considered as part of the alluvium.

Water in quantities sufficient for stock and domestic use may be obtained from this porous zone. The town of Ovid, Colo., obtains its municipal supply of water from well B12-45-29ad, which taps this zone; however, a chemical analysis of water from this well (appendix D) indicates that part of the water is derived from the overlying alluvial deposits.

PLIOCENE SERIES—OGALLALA FORMATION

Character and thickness.—The Ogallala formation consists of alternating hard and soft layers of sandstone, in part cemented with calcium carbonate, interbedded and intermixed with buff to gray or pinkish structureless clay, silt, and fine sand. Coarse gravel and pebbles are present throughout the formation but are most common in the middle part. Calcified plant roots are abundant at the type locality of the formation in the vicinity of Ogallala, Nebr. Some beds of sand and gravel are solidly cemented by calcium carbonate, are very resistant to erosion, and, in places, form ledges. According to Wenzel and Waite (1941, p. 28), the formation was laid down by desert-type streams that aggraded their channels, spilled over into new channels, and left a series of braided sand and gravel deposits and many temporary lakes in which silt and clay were deposited.

The easterly dip of the Ogallala formation is depositional at least in part and it may be partly deformational. The dip is greater than the gradient of the river; therefore, the width of the outcrop area decreases downstream. The formation ranges in thickness from a featheredge near Sedgwick to 350 feet or more near Paxton.

Distribution and surface form.—The Ogallala formation underlies parts of western Nebraska, eastern Colorado, southeastern Wyoming, western and central Kansas, western Oklahoma, northwestern Texas, and eastern New Mexico. In the area covered by this investigation, it crops out in eastern Logan County and underlies all of Sedgwick County, Colo., and Keith and Deuel Counties, Nebr. It underlies the alluvial fill in the South Platte River valley downstream from Julesburg, Colo., to Paxton, Nebr.

The clay, silt, sand, and gravel are easily eroded except where sod has preserved the surface or where resistant cemented layers are present. Such resistant layers form prominent ledges on both sides of the river east of Julesburg, Colo. In general, the Ogallala formation is eroded into steep slopes near the South Platte River and is preserved as a broad upland plain where tributary streams have not dissected it. On the uplands, it normally is mantled with loess, which modifies the initial relief.

Age and correlation.—The Ogallala formation is of Pliocene age. The type locality of the formation is near Ogallala, Nebr.; Wenzel and Waite (1941, p. 25-32) described the formation in Keith County, Nebr.

The Ogallala formation rests unconformably on the Brule formation and is unconformably overlain by loess and alluvium of Pleistocene and Recent age.

Water supply.—The Ogallala formation yields sufficient water for stock and domestic wells throughout most of Keith and Deuel Counties, Nebr., and in the northern part of Sedgwick County, Colo. In the upland area, the formation yields sufficient water for irrigation in some places, although the depth to water is as much as 200 feet. Large supplies of water could be obtained from the Ogallala where it underlies the alluvium in the South Platte River valley; however, because adequate supplies generally are available from the alluvium, no effort has been made to obtain large yields from the Ogallala formation. The lower part of the formation is mostly silt and fine sand, and only small quantities of water are derived from it. The middle part of the formation consists of interbedded sand and gravel and yields moderate to large quantities of water to wells.

QUATERNARY SYSTEM—PLEISTOCENE AND RECENT SERIES

ALLUVIUM

Character and thickness.—The alluvium in the South Platte River valley consists mainly of heterogeneous mixtures of clay, sand, and gravel, or lenses of these materials. Pebbles, cobbles, and boulders occur as erratics. The particles generally are well rounded to subrounded and range from well sorted to poorly sorted. Extensive lenses of clay are present within the alluvium. These are most prevalent in the tributary valleys and probably represent shallow-lake deposits. The lenses of silt, sand, and gravel were deposited by braided streams as they aggraded their channels. The materials in the South Platte River valley generally are coarser than those in the tributary valleys and contain fewer clay lenses. (See pl. 2 and appendix B.)

The thickness of the alluvium ranges from less than a foot at the edges of the valleys to 293 feet in test hole B10-48-11ac.

The lines showing the configuration of the pre-Quaternary erosional surface (pl. 1) indicate the location of the channels that are filled with alluvium. The approximate thickness of the alluvium can be determined by subtracting the altitude of the pre-Quaternary surface from the altitude of the land surface except where eolian material mantles the alluvial deposits.

Distribution and surface form.— Alluvium is present in the South Platte River valley both as Pleistocene and Recent terrace deposits and as Recent flood-plain deposits. Terrace deposits form the major portion of the alluvium in the South Platte River valley and its tributaries. In the area covered by this investigation, the terraces are present throughout the South Platte River valley on both sides of the river and in all the major tributary valleys. Six terrace levels in the South Platte River valley have been described by Bryan and Ray (1940) and remnants of these have been found in many places throughout the valley. No attempt was made to map the terraces, but certain terraces are so well preserved over large areas as to require specific mention.

Between Hardin and Brush, Colo., one such terrace is about 40 feet above the present level of the South Platte River. This terrace is continuous upstream along Lost, Kiowa, Bijou, Antelope, Badger, and Beaver Creeks; the unconsolidated material underlying this terrace is the major aquifer in these areas.

Another terrace is 10 to 20 feet above the level of the South Platte River. This terrace covers a major part of the South Platte

River valley east from R. 55 W. to the east edge of the area described by this report; remnants of the terrace are present between Rs. 59 and 62 W.

Lower terraces also are present near the South Platte River, but they are so nearly the same height above the river as the present flood plain that they appear to be a part of it. Higher terraces are present in many places, but generally the underlying unconsolidated materials are thin and do not contain water. North and west of Sterling, Colo., however, a terrace about 80 feet above the level of the South Platte River is underlain in places by thick saturated deposits. (See pl. 1, sheet 3.)

Extensive terrace deposits are presumed to be present in Keith County, Nebr., and northeastern Sedgwick County, Colo., but the deposits are so similar to the underlying Ogallala formation that their boundaries are indistinguishable in surface exposures. The terraces are shown on the cross sections (pl. 2).

The terraces are relatively flat. In many places they are separated from the flood plains by relatively steep slopes, but because of erosion and eolian deposition the break between adjacent terrace surfaces locally is so modified that adjacent terraces appear to grade into each other. Some terraces extend unbroken for many miles, but other terraces are much dissected and only isolated terrace deposits remain on the valley sides.

Recent alluvium underlies the South Platte River valley and each of its tributary valleys. The depth, thickness, and areal extent of the alluvium are not determinable, because the alluvium grades into the lithologically similar terrace deposits. The Recent alluvium and the terrace deposits are shown as alluvium on the areal geologic map (pl. 1).

Age and correlation.—The alluvium ranges in age from early Pleistocene through Recent. Bryan and Ray (1940) correlated the terraces west of the area covered by this investigation with substages of the Wisconsin stage of glaciation. Detailed data on topography are lacking and direct correlation of terrace surfaces in the area with the terraces described by Bryan and Ray is impossible because of erosion and eolian deposition; however, the terrace about 40 feet above the present flood plain of the South Platte River is believed to correlate with the Kersey terrace described by Bryan and Ray, and the terrace about 20 feet above the South Platte River probably correlates with the Kuner terrace. The high terrace north and west of Sterling, Colo., probably is equivalent to the Pleasant Valley surface described by Bryan and Ray.

Water supply.—The alluvium contains the major available supply of ground water in the area covered by this investigation. Throughout the South Platte River valley and its tributary valleys these deposits form an almost continuous aquifer. The extent of this aquifer is shown on the areal geologic map (pl. 1), and the amount of saturated material is shown on the saturated-thickness map (pl. 4). Because of its high permeability, the alluvium yields large quantities of water to wells in many parts of the area. Most of the inventoried irrigation wells obtain their entire yield from the alluvium.

Because lateral and vertical gradation of the alluvial material causes yields from wells in these deposits to range widely, test holes should be drilled before constructing wells from which large supplies are required. For a detailed discussion of the occurrence of water in the alluvium see pages 34–92.

DUNE SAND

Character and thickness.—Dune sand covers a large part of the area included in this investigation. It consists predominantly of very fine to medium sand and includes some coarse sand, but it also contains some silt and clay.

The thickness of the dune-sand deposits ranges from a featheredge to more than 100 feet; where the dunes are actively migrating the thickness may differ considerably in a few years.

Distribution and surface form.—Dune sand mantles older deposits throughout much of the area covered by this investigation. South of the South Platte River from near Brush, Colo., east to Sedgwick, Colo., an unbroken line of dunes has a youthful topography with a maximum relief of about 100 feet. The divides between the northward-flowing tributaries to the South Platte River in Weld, Morgan, Adams, and Washington Counties, Colo., also are mantled with youthful sand dunes. North of the South Platte River between Jackson Lake Reservoir and the west edge of the area covered by this investigation is a large area of dune sand that is actively migrating in a few places but which elsewhere has a sparse vegetative cover. Downstream from Jackson Lake Reservoir the sand dunes are thin and spotty, but northeast of Fort Morgan, Colo., they are thicker and more persistent and are prominent as far east as Sterling, Colo.

Throughout the remainder of this area, isolated patches of dune sand overlie the alluvium. (See pl. 1.)

The dunes have been elongated N. 35° W. by prevailing winds.

Age.—The dune sand accumulated largely during Pleistocene time. However, in areas of youthful dunes the present forms are of Recent age. The extensive dune-sand deposits that overlie the 40-foot and higher terraces indicate that these dunes are younger than the terraces.

Water supply.—In general the areas of dune-sand deposits are good infiltration areas for recharge to the underlying alluvial material. However, the few wells in dune-sand areas are mostly stock wells that yield only small quantities of water. In areas where a small saturated thickness of dune sand is underlain by impervious material, a few wells have been drilled through the sand into the impervious material, thus providing a small reservoir for the accumulation of water.

LOESS

Character and thickness.—Loess consists predominantly of silt and contains little material that is coarser than very fine sand. It generally is slightly calcareous and brownish yellow or almost white. The deposit is very uniform in texture, is compact, and is relatively soft. In many places an accumulation of particles of white calcium carbonate gives the material a splotched appearance. A few streaks of sand and buried soil zones are present in the loess.

The loess ranges in thickness from a featheredge to 60 feet. However, in most places it is not more than 5 or 10 feet thick.

Distribution and surface form.—Loess mantles much of the area covered by this investigation. It mantles most of the alluvial deposits, but its thickness is greatest on the divide areas and on gently sloping valley sides. In general, no loess is present on steep slopes and on the river flood plains; in areas mantled with sand dunes it generally grades in the coarser dune material.

The distribution of loess is not shown on the areal geologic map (pl. 1).

Age.—The loess is of Pleistocene and Recent age. Wenzel and Waite (1941, p. 25) believe the loess in Keith County, Nebr., was deposited largely during the Peorian stage of the Pleistocene epoch, although some of it was deposited in Recent time.

Water supply.—The loess lies above the water table in most places and is not known to yield water to wells in the area covered by this investigation.

GROUND WATER

OCCURRENCE

The fundamental principles governing the occurrence and movement of ground water have been set forth in detail by Meinzer (1923a, p. 2-102); the reader is referred to his report for a detailed discussion of the subject. Only a few of the essential statements will be made here.

Ground water is the water in the zone of saturation beneath the land surface. It exists in many openings, which are called voids, pores, or interstices, in the rock or material it occupies, and is the source of supply for wells and springs. Ground water is derived chiefly from water that falls as rain or snow. A part of this water runs off directly into streams, a part evaporates, a part is used by plants, and a part passes through pore spaces in the soil and underlying rocks to the water table, later to discharge into streams or to be dissipated by evaporation and transpiration. The porous rocks below the water table as a rule are saturated. In the more permeable rocks, such as sand and gravel and some of the sandstones, the individual pores are interconnected and are large enough so that the water moves through them with relative ease under the influence of gravity, but in less permeable rocks, such as the shales and the fine-grained sandstones, the pores are so small that water moves through them very slowly. Gravel is superior to any other material in its capacity to store and yield water. Coarse clean well-sorted sand or gravel absorbs water readily, stores it in large quantites, and yields it freely to wells. Fine sand, silt, and clay, on the other hand, store much water but will not readily yield it to wells.

If the ground water is confined under pressure by an overlying impervious stratum, the water is said to be confined or artesian. If it is not confined, the water is said to be under water-table conditions, and the water table is defined as the upper surface of the zone of saturation. A moist but not fully saturated zone just above the water table is called the capillary fringe. The capillary fringe ranges in thickness from a fraction of an inch in coarse sand or gravel to several feet in clay or silt.

The principal source of ground water in the project area is the alluvium in the valleys of the South Platte River and its tributaries—Lost, Kiowa, Bijou, Sand Arroyo, Badger, Beaver, Wildcat, Pawnee, and Lodgepole Creeks. In addition to its occurrence in the alluvium, ground water is present also in small or moderate quantities in the dune-sand deposits that flank the valleys and in the bedrock formations that flank or underlie the valleys.

HYDROLOGIC PROPERTIES OF WATER-BEARING MATERIALS

The quantity of water that a water-bearing material will yield to wells depends principally upon the thickness, permeability, and coefficient of storage of the material. The permeability and coefficient of storage vary with differences in the size, shape, number of the interstices and their degree of interconnection.

The permeability of a water-bearing material is its capacity for transmitting water under pressure. The coefficient of permeability used in this report is called the field coefficient of permeability and is defined as the number of gallons of water per day that percolates, at the prevailing temperature of the water, through each mile of the water-bearing bed (measured at right angles to the direction of flow) for each foot of thickness of the bed and for each foot per mile of hydraulic gradient (Wenzel, 1942, p. 7-11). The coefficient of transmissibility may be expressed as the number of gallons of water per day, at the prevailing temperature, transmitted through each mile strip of the saturated thickness of the aquifer under a hydraulic gradient of 1 foot to the mile; hence, it is the average coefficient of permeability, as defined above, multiplied by the saturated thickness of the aquifer in feet.

The quantity of water that can be removed from storage in a saturated material depends upon the coefficient of storage of the material. The coefficient of storage is defined as the unit volume of water yielded from a vertical prism of the aquifer of unit cross section when the head declines a unit distance. Under artesian conditions the coefficient of storage is a small value, generally 10^{-3} to 10^{-5}, representing water derived by compaction of fine-grained materials, and by expansion of the water itself, as the head declines. Under water-table conditions the coefficient includes this small amount plus the generally much larger amount represented by the water that drains by gravity out of the uppermost material as the water table declines. This larger amount, called the specific yield, is defined as the ratio of the volume of water that a saturated aquifer will yield by gravity to the volume of the aquifer. Not all water contained in the interstices of a material, however, will be drained by gravity, because some will be retained by capillary action. The volume of retained water, expressed as the ratio of the total volume of the material, is called the specific retention of the material. The specific yield and specific retention are together equal to the porosity, which is the percent of void space contained in a material. Thus, if 100 cubic feet of a saturated formation will yield 8 cubic feet and retain 13 cubic feet of water, when drained by gravity, the specific yield is 0.08 or 8 percent, the specific retention is 0.13 or 13 percent, and the porosity is 0.21 or 21 percent.

PUMPING TESTS

The coefficient of transmissibility and the coefficient of storage of the alluvial deposits were determined by pumping tests at six sites. During each pumping test the changes in water level were measured in observation wells located at different distances from a pumped well. (See fig. 5.) From the data gathered during the

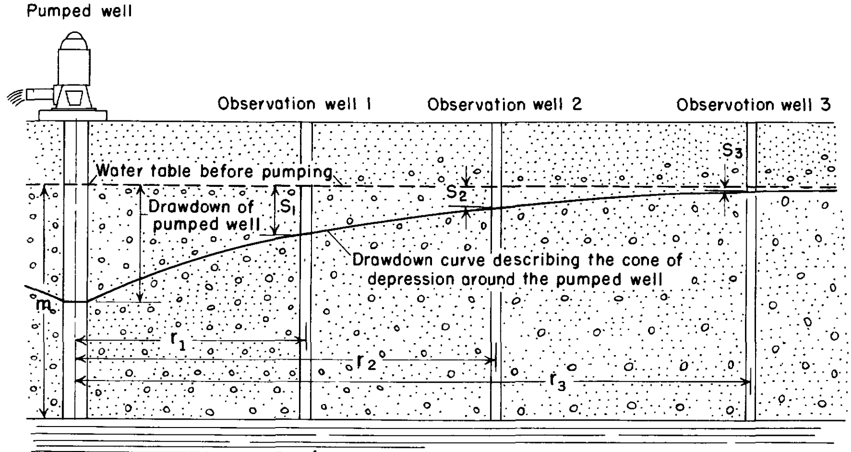

Figure 5. —Diagrammatic section of the water table near a well that is being pumped.

tests, the coefficients of transmissibility and storage were computed by the Thiem method. At the completion of several of the tests, the coefficient of transmissibility was computed by the Theis recovery method (Theis, 1935, p. 519-524) as a check on the Thiem method. The results of these computations are given in table 2.

The Thiem method of determining the transmissibility of a water-bearing material involves the analysis of the decline in water level during the pumping period in two or more observation wells near a pumped well. The method is based on the assumptions that water percolates toward the pumped well equally from all directions, that the same quantity of water percolates toward the well through each of the series of concentric cylindrical sections around the pumped well, and that, with a constant rate of pumping, approximate equilibrium is established and very little water is removed from storage close to the well. The derivation of the general Thiem formula has been discussed by Wenzel

Table 2.—*Results of pumping tests*

	Well no.					
	B3-58-3ba	B4-59-13dc	B2-62-19cd	B2-56-12da3	B1-59-19bb	B3-56-26bb
Date of test	Feb. 1948	May 1948	Nov. 1948	Oct. 1949	May 1950	Nov. 1950
Duration of test (hours)	51	54	77.5	73.5	10	72
Pump discharge (gallons per minute)	898.5	1,257	896	713	1,360	635
Drawdown at pumped well (feet)	4.89	13.21	21.95	13.55	....	20.49
Specific capacity of pumped well (gallons per minute per foot of drawdown)	184	95	41	53	....	31
Saturated thickness of formation (feet)	91.7	60	48	48	89	87
Coefficient of transmissibility (gallons per day per foot)	290,000	142,000	92,000	136,000	44,000	57,000
Average coefficient of permeability (gallons per day per square foot)	3,160	2,360	1,915	2,840	490	654
Theoretical radius of influence at end of test (feet)	1,025	745	745	1,520	1,975	25,000
Storage coefficient	0.179	0.173	0.162	0.055	0.00139	0.000082
Transmissibility by Theis recovery method	339,000	....	....	184,500	....	56,000

(1942, p. 81), and a graphical solution of the Thiem formula has been discussed by Jacob[1] .

The Thiem formula may be written:

$$T = \frac{527.7Q \log_{10} r_2/r_1}{s'_1 - s'_2}$$

in which T = coefficient of transmissibility in gallons per day per foot (as defined on p. 35);
Q = discharge of pumped well, in gallons per minute;
r = distance of observation wells from the pumped well, in feet;
s = observed drawdown of water level in the observation wells, in feet;
s' = adjusted drawdown of water level in the observation wells, in feet, and is equal to $s - \frac{s^2}{2m}$;
and m = saturated thickness of the aquifer, in feet.

In the above equation, let $\Delta s'$ be that value of $s'_1 - s'_2$ for which the value of $\log_{10} r_2/r_1$ is unity (that is, $\Delta s'$ corresponds to one log cycle of r_2/r_1). The equation then becomes

$$T = \frac{527.7Q}{\Delta s'}$$

The value $\Delta s'$ is determined from a plot of the adjusted drawdowns at a given time, against the logarithm of the corresponding distances from the test well.

The specific yield is computed by using the following formulas[2]:

$$S = \frac{0.3\ Tt}{r_e^2}; \quad S' = S\left\{\frac{(m-s)}{m}\right\}$$

in which S = apparent coefficient of storage;
S' = specific yield (as defined on p. 35);
s = observed drawdown at the geometric mean distance, in feet;
m = saturated thickness of the aquifer, in feet;
t = time since pump started, in days;
and r_e = maximum extent of cone of depression at time (t), in feet.

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[1] Jacob. C. E., 1944, Notes on determining permeability by pumping tests under water-table conditions: U. S. Geol. Survey mimeographed memorandum.
[2] Idem.

The coefficients of transmissibility and storage determined by the tests, although locally representative, are not necessarily indicative of the values throughout the entire project area, as they differ considerably with differences in composition and thickness of the aquifer. Therefore, where computations of underflow were made, the values of permeability that were thought to be most representative of the particular area were used.

The storage coefficients shown in table 2 represent minimum values, because a storage coefficient increases with time as additional water drains from that part of the aquifer within the cone of depression created by pumping. The average storage coefficient of the alluvium in the project area was assumed to be about 20 percent, and that value was used in estimating the quantity of water stored in the alluvium.

BEHAVIOR OF GROUND WATER IN THE VICINITY OF DISCHARGING WELLS

Under water-table conditions, as soon as a pump begins discharging water from a well, the water table in the vicinity of the well is lowered and a hydraulic gradient toward the well is established. The water table assumes the form of an inverted cone, the apex of which is at the well. At first, most of the water pumped from the well is derived from the saturated material surrounding the well, but as pumping continues, this material is gradually dewatered and water is transmitted to the well from an ever-increasing distance. Thus, the extent of the cone of depression becomes greater and the water table within the cone declines gradually. The shape of the cone is altered if water is added to the formation by natural or artificial recharge.

After pumping is stopped, water continues to percolate toward the well so long as the hydraulic gradient is in that direction; the water gradually refills both the well and the adjacent material dewatered by pumping. As the material near the well is refilled, the hydraulic gradient decreases and the recovery of the water level in the well is correspondingly slower. A general equalization of water levels eventually takes place over the affected area; the water table tends to assume its original form, although in the absence of recharge it may remain temporarily or permanently lower than before water was withdrawn. In areas where irrigation wells are closely spaced, pumping lifts are increased greatly by the combined effects of pumping.

In artesian aquifers, the coefficient of storage is dependent on the compressibility of the aquifer and the adjacent confining beds, and of the water itself; it generally is less than a hundredth as large as the coefficient of storage of the same material under water-table conditions. The cone of depression expands many times as fast as it does under water-table conditions. Therefore, mutual interference between wells occurs sooner and is more extensive under artesian conditions than under water-table conditions.

THE WATER TABLE

The water table is defined as the upper surface of the zone of saturation except where that surface is formed by an impermeable body (Meinzer 1923b, p. 32). The piezometric surface of an artesian aquifer is an imaginary surface that everywhere coincides with the static level of the water in the aquifer (Meinzer 1923b, p. 38). The water level in a well coincides with the water table under water-table conditions and with the piezometric surface under artesian conditions. If the piezometric surface is above the land surface, water will flow from wells that tap the aquifer. Owing to the random arrangement of lenticular beds of sand, gravel, and clay, both water-table and artesian conditions exist in the alluvial deposits in the area. However, the water table and piezometric surface generally either coincide or are continuous with each other.

SHAPE AND SLOPE OF THE WATER TABLE

The water table, in general, is not level or uniform but is a warped, sloping surface. Many irregularities in the slope and in the direction of slope are caused by differences in thickness or in permeability of the aquifer or by unequal additions or withdrawals of water. Ground water moves in the direction of greatest slope of the water table or piezometric surface, and the rate of movement, assuming a uniform cross section, is proportional to that slope (hydraulic gradient) and to the permeability of the water-bearing material. The direction of movement is shown by contour lines on the water table. A contour on the water table is a line along which all points have the same altitude. During November and December 1949 the depth to water was measured in wells whose altitudes had been established for the purpose of constructing a water-table contour map. (See pl. 3.)

In the South Platte River valley the water table generally slopes diagonally downstream and toward the river. Ground water, therefore, discharges into the river, making it a gaining stream. During periods of low flow, all or almost all the water in the river is derived from the ground-water reservoir. The slope of the water table in the direction of river flow is about the same as the gradient of the river, which loses 1,500 feet in altitude between Hardin, Colo., and Paxton, Nebr., a distance of about 200 miles (not including meanders in the river)—that is, the average slope is about 7.5 feet to the mile. This is not the slope of the water table toward the river but is the downstream component of that slope.

In the valleys of the tributary creeks, the water table slopes in a general downvalley direction and where the tributary valleys merge with the valley of the river, the movement of ground water gradually changes into a diagonal downriver direction.

The water-table gradients in several tributary valley areas were determined from the water-table contour map and are as follows: (1) In the Prospect Valley area (Lost Creek valley south of Roggen, Colo.), the gradient ranges from 7 to 20 feet to the mile and the water table loses 180 feet of altitude in 13 miles, or an average of 13.8 feet to the mile; (2) in the Bijou and Kiowa Creeks area, the gradient ranges from 7 to 30 feet to the mile and the water table loses 480 feet in 31 miles, or an average of 15.5 feet to the mile; (3) in the Badger Creek valley, the gradient ranges from 6 to 25 feet to the mile and the water table loses 140 feet in 12 miles, or an average of 11.7 feet to the mile; and (4) in Beaver Creek valley, the gradient ranges from 7 to 15 feet per mile and the water table loses 260 feet in 22 miles, or an average of 11.8 feet to the mile.

The character and thickness of the water-bearing materials and of the underlying bedrock affect the shape and slope of the water table. In areas where moderately permeable dune sand, loess, or sandy soil are underlain by the relatively impermeable Laramie formation, Pierre shale, Chadron formation, or Brule formation the water table tends to follow the configuration of the bedrock surface and slopes toward the valleys at gradients that are as much as 100 feet to the mile. In areas underlain by the moderately permeable Fox Hills sandstone and Ogallala formation, the water table generally extends from the alluvium into the bedrock formations without any significant change of shape or slope.

The lack of uniformity in the texture and permeability of the alluvium is in many places reflected in the shape and slope of the water table. Near Fort Morgan, Colo., where the Bijou canal flows through an area that is underlain by about 100 feet of fine sand, the recharge from canal seepage and infiltrating irrigation water has raised the water table to within a few feet of the land surface. The water table slopes northeastward at a gradient of 40 to 60 feet to the mile for a distance of about 1.5 miles to an area that is underlain by permeable sand and gravel where it flattens out to a slope of about 10 feet to the mile. (See fig. 6.) The seepage loss from the Fort Morgan canal, where it flows over

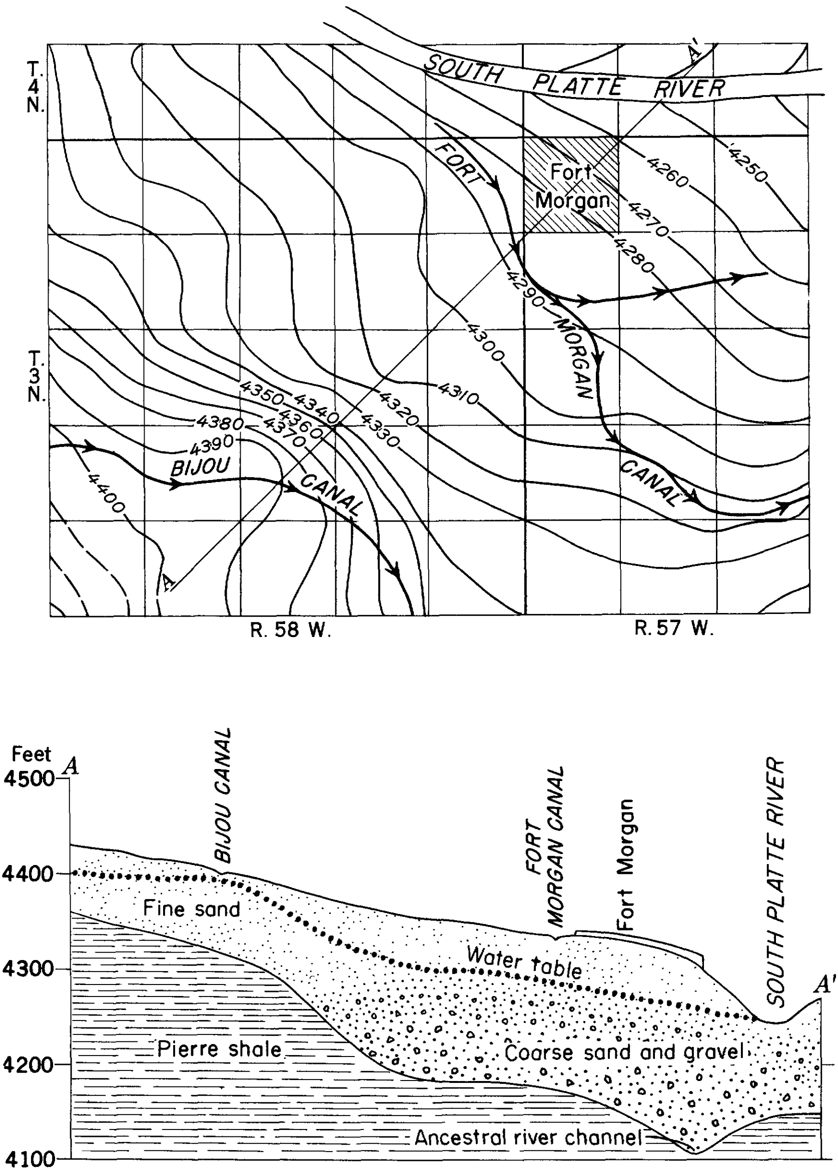

Figure 6.—Map and cross section (A-A') of an area near Fort Morgan, Colo., showing the changes in the shape and slope of the water table due to changes in the permeability of the water-bearing material.

the area underlain by the permeable sand and gravel, has not appreciably altered the shape and slope of the water table. In the area where the water-table gradient is steep, irrigation wells have not been successful regardless of the abundance of ground water, whereas, in the area with a slight water-table gradient, irrigation wells have been successful.

FLUCTUATIONS OF THE WATER TABLE

The water table is not a stationary surface but rises or falls when water is added to or withdrawn from the underground reservoir. In areas where large quantities of water are pumped for irrigation, such as in the Prospect Valley area and in the valleys of Bijou, Badger, and Beaver Creeks, the water table is lowered during the pumping season and gradually recovers between pumping seasons. (See fig. 7.) If ground-water discharge exceeds recharge over a period of years, a general decline of ground-water levels in the area will result. In areas that are irrigated chiefly with canal water, such as the South Platte River valley near Goodrich and Weldona, Colo., and between Brush and Sterling, Colo., the water table rises during the irrigation season and declines during the nonirrigation season. Periods of high precipitation cause the

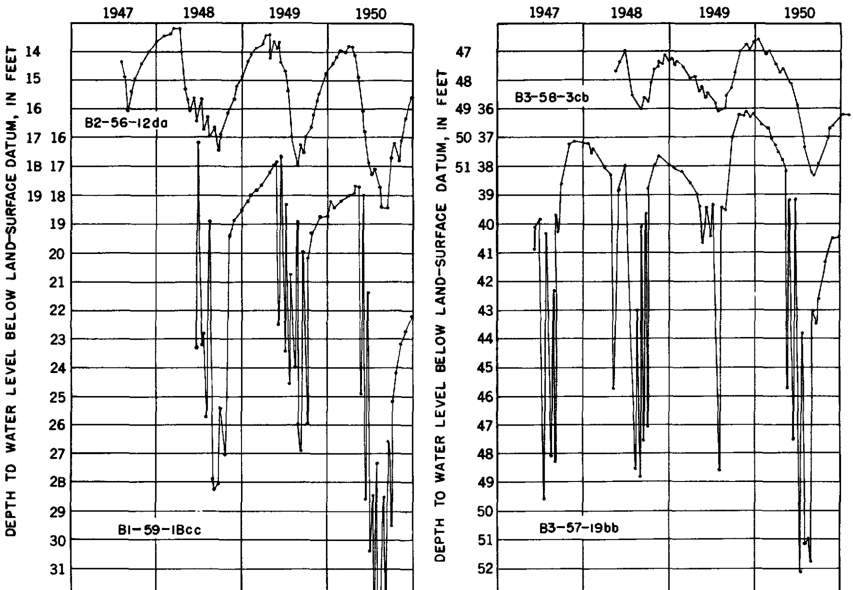

Figure 7. —Fluctuations of water levels in wells caused by irrigation pumping and recovery of the water level after pumping.

water table to rise whereas long dry periods generally cause it to decline. Periodic water-level measurements were made at 189 observation wells from 1947 through 1950; earlier measurements at 80 of the wells were obtained from Colorado and Nebraska water-level reports and files. (See appendix A.)

The water level in some wells may fluctuate also in response to other factors, such as the tidal attraction of the moon and changes in atmospheric pressure. The hydrographs shown in figure 8 were obtained for the same period of time from water-level recording gages on two wells 13 miles apart; an inverted barograph chart for this period was prepared from data furnished by the U. S. Weather Bureau of Stapleton Airport, Denver, Colo., and was plotted with the two hydrographs. The similarity between the two hydrographs and the barograph indicates that the water levels in the two wells, like the barometer, fluctuates with the changing air pressure.

The water levels in wells may be affected also by the pumping of nearby wells. Under water-table conditions the cone of depression around a pumped well expands relatively slowly. The water-level fluctuations in the vicinity of well B3-58-3ba are characteristic of those that occur under water-table conditions. When the well was pumped at a rate of 900 gpm the drawdown in a well 400 feet away was only 0.12 foot after an hour of pumping and was 0.65 foot after 51 hours of pumping; the radius of influence after 51 hours of pumping was computed to be about 1,035 feet. Most of the water in the alluvial deposits in the area is under water-table conditions.

Under artesian conditions, the cone of depression around a pumped well expands rapidly and causes prompt lowering of the water level in nearby wells. The charts from the water-level recording gage on well B3-57-19bb show that the water level began to decline 55 seconds after a well 420 feet away began pumping at a rate of 770 gpm or 20 minutes after a well 2,700 feet away began pumping at a rate of 1,160 gpm. The total decline after about 10 hours of pumping the nearer well was about 9 feet and the decline after pumping the farther well for the same length of time was about 1 foot. The rapidity with which the water level was affected at these distances indicates that the water is confined beneath a relatively impervious stratum and, hence, is under slight artesian head. Investigation showed that a 9-foot layer of clay overlies the water-bearing sand and gravel in the vicinity of the observation well.

The hydrologic conditions affecting the fluctuations of the water table vary in different parts of the South Platte River valley project

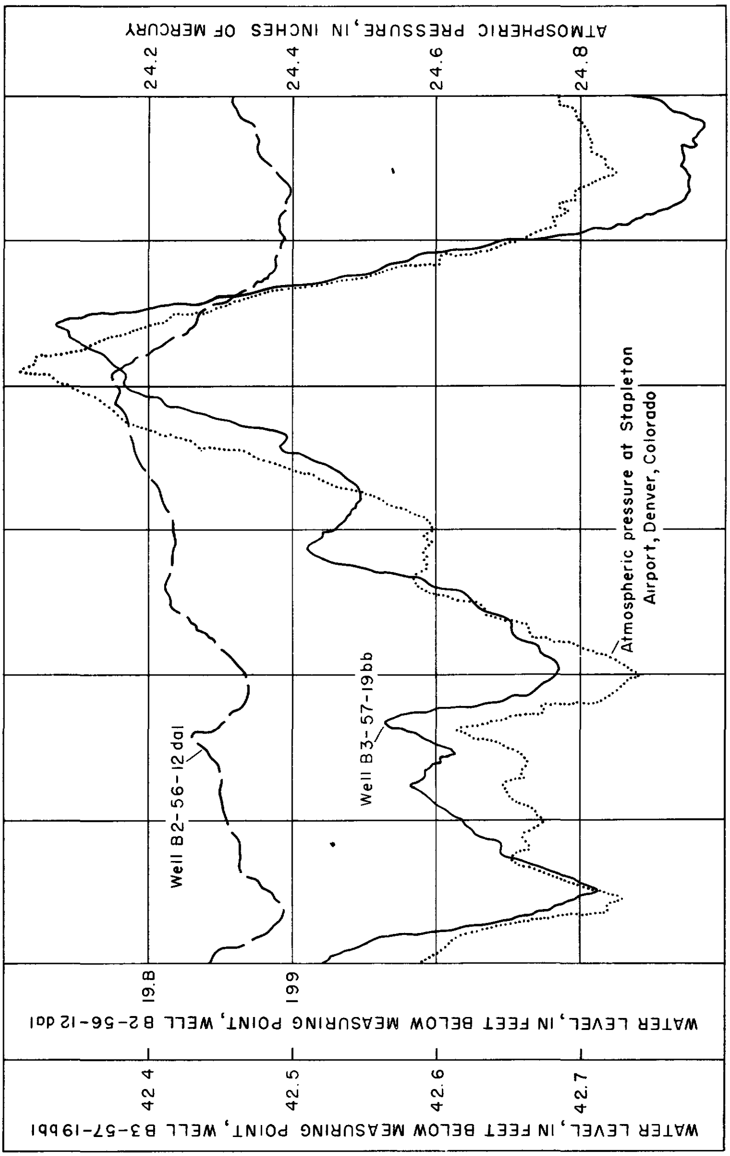

Figure 8.—Fluctuations of water levels in wells caused by changes in atmospheric pressure, February 19–24, 1948.

area. The project area was divided into eight areas within each of which the hydrologic conditions were thought to be relatively uniform. These areas are shown in figure 9. Fluctuations of the water table within the eight areas are discussed below. Selected hydrographs made for wells in some of the areas are shown in figure 10. If the reader wishes to examine a more complete and detailed record of the water-table fluctuations, he is referred to appendix A.

PROSPECT VALLEY AREA, COLORADO

Water levels declined steadily in the Prospect Valley area between 1934 and 1942. In 1942 the trend was reversed and water levels in the area rose an average of about 10 feet during the next 8 years. The hydrograph for well B2-63-32aa (fig. 10) shows water-level changes that are typical of the general ground-water trend in the area.

The general rise of the water table in the Prospect Valley area since 1942 is believed to be the result of the above-normal precipitation since about that time. Surface water is available for irrigation during the early part of the growing season but, as the area has a low priority for surface water, the supply usually is depleted before the first of July. Although irrigation water during the remainder of the growing season is obtained by pumping ground water, recharge by seepage from reservoirs, canals, and applied irrigation water has exceeded withdrawals from the ground-water reservoir. During the dry period that preceded 1942, very little surface water was available and most of the irrigation water was pumped from the ground-water reservoir. This heavy pumping caused the water table to fall. If another prolonged dry period should occur and the surface-water supply should be reduced, the water table probably will decline again.

HARDIN TO WELDONA, COLO.

Several canals and reservoirs flank the valley between Hardin and Weldona and irrigation is largely by surface water. Ground-water levels generally are high at the end of the irrigation season, owing to recharge from seepage. A few irrigation wells supplement the surface-water supply. Water-level data collected during 1947 through 1950 indicate no general upward or downward trend of the water table; however, water levels undoubtedly have risen since the construction of the surface-water irrigation systems during the period 1900-10.

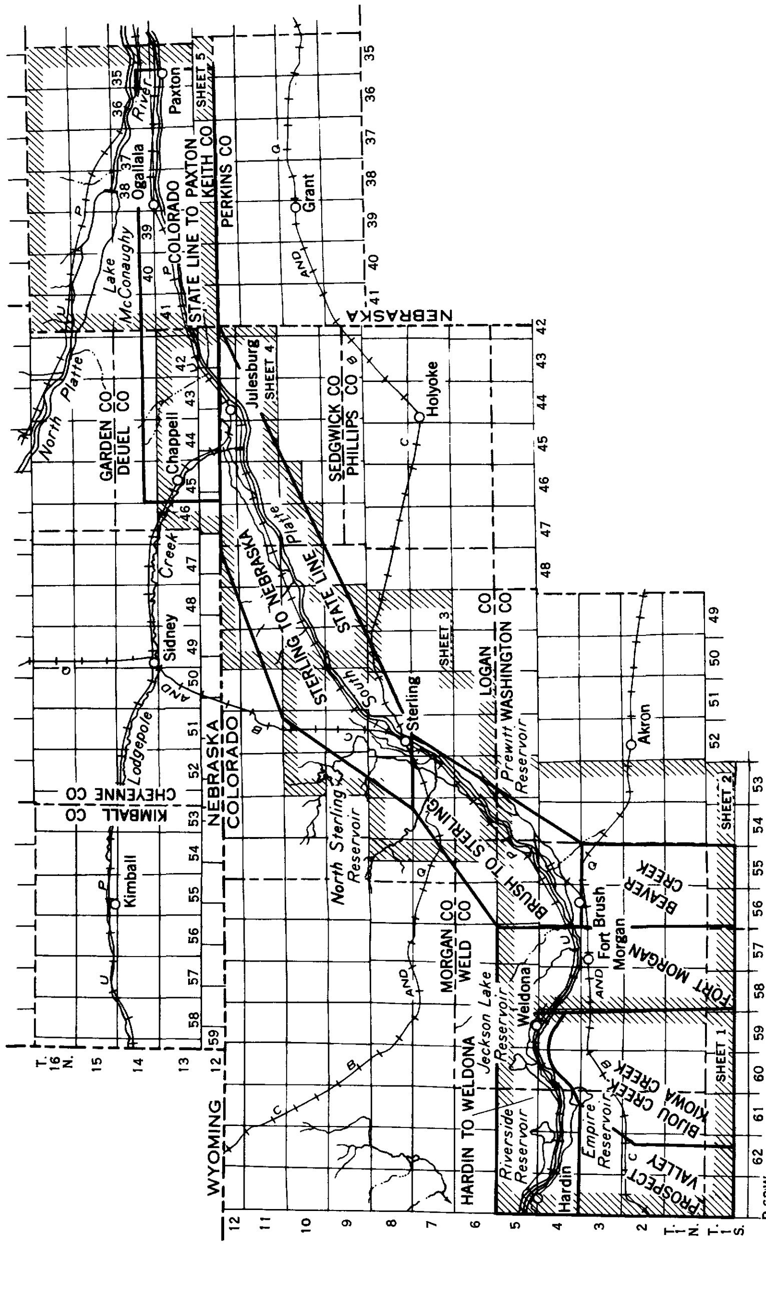

Figure 9. —Map of lower South Platte River valley showing areas in which hydrologic conditions are relatively uniform.

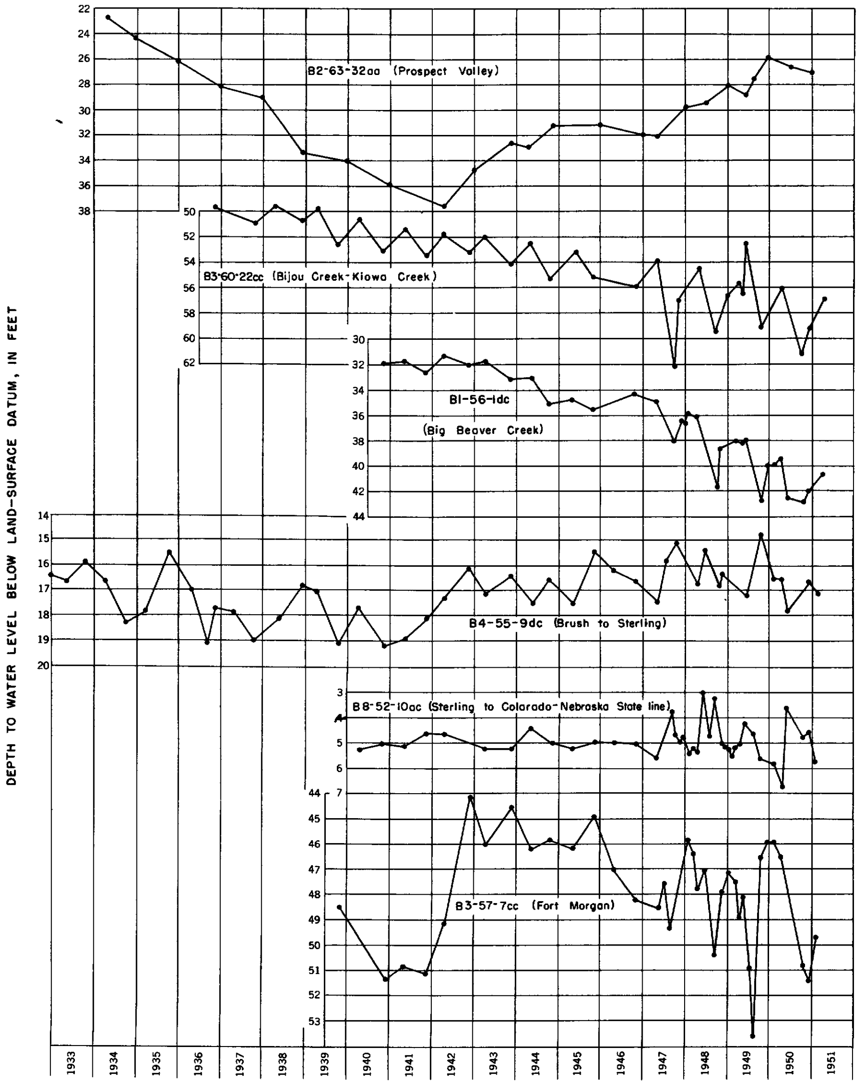

Figure 10.—Water-table fluctuations in representative areas in the lower South Platte River valley project area.

VALLEYS OF BIJOU AND KIOWA CREEKS, COLORADO

Water levels in the Bijou and Kiowa Creeks area have been declining for several years as a result of heavy pumping. The hydrograph of well B3-60-22cc (fig. 10) shows changes in water levels that are typical of most of the wells in the area. Water-level measurements indicate that the average decline of the water table during the 11-year period 1940-50 was about 8 feet, of which about 2 feet occurred during 1950. The large decline of the water table during 1950 was due largely to heavy pumping during the unusually dry growing season. The area of water-level decline is within Tps. 1-4 N., 1 and 2 S., and Rs. 59 and 60 W., and includes about 130 square miles. It extends southward about 30 miles from near the South Platte River to about 7 miles south of the Morgan-Adams County line. Irrigated land in this area is entirely dependent on wells for water. More than 250 irrigation wells supply water to about 37,000 acres. Most of the wells have been installed during the past 15 years.

An estimate of the rate of depletion of ground water in the Bijou and Kiowa Creeks area for the 4-year period 1947-50 was determined by computing the ratio of the average decline of the water table during that period to the average saturated thickness of the aquifer at the beginning of the period. About 4 percent of the ground water in storage was removed during these 4 years; the maximum rate of depletion of 7.1 percent occurred in T. 2 N., Rs. 59 and 60 W. (See table below.)

Data relating to occurrence of ground water in the valleys of Bijou and Kiowa Creeks

	Rs. 59 and 60 W.				
	T. 1 S.	T. 1 N.	T. 2 N.	T. 3 N.	T. 4 N.
Range in thickness of alluvium, in feet	80-130	72-140	80-185	90-230	110-240
Average thickness of alluvium, in feet	106	104	132	150	194
Range of depths to water level, in feet	16-44	15-43	27-66	26-76	40-82
Average depth to water level, in feet	27	28	46	55	71
Average drawdown of water level in pumped wells, in feet	33	32	27	27	15
Average saturated thickness of the aquifer, in feet	75	76	86	95	123
Average water-table decline 1947-50, in feet	2.1	3.6	6.0	4.0	4.7
Average percent of depletion of the water stored in the aquifer 1947-50	2.8	4.7	7.1	4.2	3.8

Not all the ground water in the aquifer is available for pumping because movement of water into a well is possible only when sufficient water remains in the aquifer to create a hydraulic gradient toward the well. When a declining water table nears the bottom of an aquifer, the yield of wells decreases to the extent that pumping for irrigation becomes economically infeasible.

FORT MORGAN AREA, COLORADO

Water levels during the past 10 years have not changed appreciably in the part of the Fort Morgan area (Tps. 3 and 4 N., Rs. 57 and 58 W.) that is irrigated both by water diverted from the river and by ground water. Water levels in the area, however, generally fluctuate considerably from season to season. The hydrograph of well B3-57-7cc (fig. 10) shows the magnitude of the seasonal fluctuation of the water level in a well in the area.

After the construction of the Bijou Creek and Fort Morgan irrigation systems, the southern part of T. 3 N., R. 57 and 58 W., became waterlogged and several water-table lakes were formed. The pumping of irrigation wells subsequently installed lowered the water table and the lakes and waterlogged area disappeared.

A general decline of the water table has occurred in the part of the Fort Morgan area that is totally dependent on wells for irrigation water (about 12 square miles in T. 2 N., R. 57 W.). The average decline of the water levels in three observation wells for the 3-year period (1948-50) was 3.9 feet, of which 2.2 feet occurred during 1950. The approximate depletion of the aquifer during the 3-year period was about 6.7 percent of the water in storage. Depletion is believed to be most serious at the southern end of the area where the saturated thickness of the aquifer is only about 25 feet.

BEAVER CREEK VALLEY, COLORADO

The water table in the part of Beaver Creek valley in Tps. 1 S. and 1 and 2 N., Rs. 55 and 56 W., has been declining steadily for several years. The hydrograph of well B1-56-1dc (fig. 10) shows water-level fluctuations believed to be typical of the area. The area of water-level decline covers about 30 square miles and contains 108 irrigation wells, which supply water to about 10,000 acres of land. The greatest decline is in the vicinity of Gary, Colo., where the water level in well B1-56-1dc declined 10.07 feet in 10 years; 2.05 feet of this decline occurred during 1950. The average decline of the water table in the area for the period 1947-50 was 3.8 feet, of which 1.1 feet occurred during 1950. The decline of the water table is more critical in the Beaver Creek valley than in any other part of the South Platte River valley project area, because the water-bearing materials are thin in comparison to those in other parts of the project area. A few irrigation wells in the vicinity of Gary are reported to be "sucking air," a condition that occurs when the drawdown of the water level in a pumped well reaches the pump intake. To remedy such a condition either the pump intake must be set lower in the well or the rate of pumping must be decreased. Many of the pumps already are set near the bottom of the wells. The estimated depletion of ground water in part of the Beaver Creek valley is given in the table below.

Data relating to occurrence of ground water in part of the Beaver Creek valley

	Rs. 55 and 56 W.	
	T. 1 N.	T. 2 N.
Range in thickness of alluvium, in feet	43-83	32-80
Average thickness of alluvium, in feet	64	60
Range of depths to water level, in feet	16-55	8-30
Average depth to water level, in feet	35	18
Average drawdown of water level in pumped wells, in feet	16	18
Average saturated thickness of the aquifer, in feet	29	42
Average water-table decline 1947-50, in feet	5.0	2.7
Average percent of depletion of the water stored in the aquifer 1947-50	17.2	6.4

The water table appears to be rising slightly in that part of Beaver Creek valley in T. 3 N., R. 56 W.; a rise of water level of about 1 foot in 20 years is indicated by the record of well B3-56-24bb. As there are only a few irrigation wells in the area, not much water is pumped from the ground-water reservoir.

BRUSH TO STERLING, COLO.

In the South Platte River valley between Brush and Sterling, Colo., the water table usually rises during the irrigation season and declines between seasons. Most of the farm land is irrigated by water diverted from the South Platte River; ground water generally is pumped only to supplement the surface-water supply. Water-level data collected in this area indicate that the water table has been rising since about 1940; this has been a period of above-normal precipitation and of surplus river-water supply for the area. The hydrograph of well B4-55-9dc (fig. 10) shows water-level fluctuations typical of the area. A continued rise of the water table may cause waterlogging in the parts of the area where the water table is near the surface. The water table is less than 10 feet below the land surface in much of the area. (See pl. 3.)

STERLING, COLO., TO COLORADO-NEBRASKA STATE LINE

In the South Platte River valley between Sterling, Colo., and the Colorado-Nebraska State line no general upward or downward trend of the water table during recent years has been noted. The water-level fluctuations shown in the hydrograph of well B8-52-10ac (fig. 10) are believed to be typical of water-table fluctuations throughout the area. Only a few irrigation wells are in the area and they generally are pumped only to supplement the surface-water supply. The water table usually rises during the irrigation season and declines during the nonirrigation season.

COLORADO-NEBRASKA STATE LINE TO PAXTON, NEBR.

The position of the water table in this area has not changed appreciably since 1935. A comparison of the data collected during this investigation with data collected during a study of the ground-water resources of Keith County, Nebr., (Wenzel and Waite, 1941) shows that the depth to water and the shape of the water-table contours have remained essentially constant since 1935. Water levels in areas that are irrigated with surface water rise during the irrigation season and decline during the nonirrigation season, whereas, water levels in areas that are irrigated entirely by ground water decline during the irrigation season and rise during the nonirrigation season.

GROUND-WATER RECHARGE

Recharge is the addition of water to the ground-water reservoir. It may result directly from precipitation and indirectly as seepage from streams, canals, reservoirs, and applied irrigation water and as underflow of ground water into the area from adjacent areas. All these types of recharge are important in the South Platte River valley; the order of their importance depends upon local conditions.

SEEPAGE FROM CANALS, RESERVOIRS, AND IRRIGATION

Before this area was irrigated, the South Platte River reportedly was an intermittent stream and generally was dry during the summer. Now, however, the ground-water reservoir is recharged by seepage from the many reservoirs and canals, and the South Platte River is a perennial stream. Bijou Creek has become a perennial stream below the place where it is crossed by the Fort Morgan canal, and Pawnee Creek has changed from an intermittent to a perennial stream below the place where it is crossed by the North Sterling canal. Local authorities estimate that less than a third of the water that is diverted from the South Platte River is delivered to the farmers for irrigation; the balance is lost by seepage and by evaporation. According to studies made by Parshall (1922, p. 50-52) on seepage losses from canals, the Jackson Lake inlet canal lost about 1 cfs (cubic foot per second) per mile while flowing at a rate of about 145 cfs and the Empire intake canal lost about 1 cfs per mile while flowing at a rate of about 250 cfs.

According to J. C. Howell, superintendent of the Bijou Irrigation Co., and C. J. Osborne, superintendent of the Riverside Irrigation Co., this loss of water from canals and reservoirs helps make possible irrigation from the river because flow in the river is thus assured when the water is needed.

The Empire Reservoir, which is about 5 miles northwest of Wiggins, Colo., covers an area of 2,842 acres when full. Mr. Howell reports that 90 cfs of water is required to maintain a full reservoir at the beginning of the irrigation season when no water is being withdrawn. If the intake supply is stopped, the reservoir surface subsides at a rate about 0.05 foot per day. If the reservoir previously had been standing dry for some time and mud cracks had formed, the rate of decline is about twice the normal rate, or about 0.10 foot per day. As the water has no visible escape and as the loss of water by evaporation normally would account for a decline of only about 0.02 foot per day, the balance of about 0.03 foot per day is seeping into the ground and into the ground-water reservoir. The Bijou Reservoir, which is about 5 miles northeast of Wiggins, Colo., loses water even faster than the Empire Reservoir. According to Mr. Howell, the greater rate of loss from this reservoir is due to the fact that it is filled and emptied intermittently and the bottom dries out between fillings.

Mr. Osborne reported the following information about seepage from the Riverside Reservoir. During March 1948 the reservoir, which covers an area of 3,800 acres, was covered with ice which reduced evaporation to a negligible amount. The outlets of the reservoir were closed and enough water was admitted at the intake to maintain a constant gage reading throughout the month. This quantity of water amounted to 4,120 acre-feet; hence, that amount apparently was lost by seepage during the 31 days. This seepage is equivalent to a loss at the rate of 67 cfs and is the equivalent of a decline of the water surface of 0.035 foot per day. Mr. Osborne also reported that about 5,000 acre-feet per month is needed to maintain a constant gage reading, with no withdrawals, during the summer when water evaporates more rapidly. On the basis of a 30-day month, this amounts to a loss of about 84 cfs due to the combined effects of seepage and evaporation; about 17 cfs is due to evaporation alone. Therefore, about 80 percent of the loss from the reservoir was due to seepage and about 20 percent of the loss was due to evaporation.

The Olds Reservoir, which is near the south end of the Prospect Valley area, was constructed to store about 250 acre-feet of water, but it was soon abandoned because of high seepage losses. These losses are reported (Code, 1945, p. 11) to range from about 17 acre-feet per day at a stage of 75 acre-feet to about 50 acre-feet per day at full stage. Surplus surface water is sometimes discharged into the reservoir; this causes a water-level rise in nearby wells. Between March 17 and April 26, 1948, 2,378 acre-feet was discharged into the reservoir and caused a water-level rise of about 2 feet in well B1-63-28ab and about 1 foot in well B1-63-27dc, which are 1,000 feet and 3,000 feet, respectively, from the reservoir. Seepage from Lord Reservoir, which is on the west side of the area, also contributes to ground-water storage; loss from evaporation and seepage is reported to be about 0.05 foot per day (Code, 1945, p. 12) of which about 0.03 foot per day is estimated to be seepage loss.

PRECIPITATION

The average annual precipitation in the lower South Platte River valley area ranges from about 12.6 inches at Greeley, Colo., to about 19.5 inches at Ogallala, Nebr. (See table 1.) The amount of precipitation that reaches the ground-water reservoir depends on the amount and distribution of rainfall, the composition and physical character of the soil and underlying materials, the vegetation, the proximity of the water table to the land surface, and the shape and slope of the land surface. Water infiltrates more readily in areas mantled by permeable materials, such as dune sand or sandy soil, than in areas mantled by less permeable materials, such as soils derived from loess, silt, clay, or shale. Much of the area that flanks the valley and tributary valleys is covered with dune sand. (See pl. 1.) The accumulation of ground water resulting from the infiltration of local precipitation in such areas generally causes the water table to stand at a higher altitude than in adjacent areas.

STREAMS

Perennial streams, such as the South Platte River, which lie below the general level of the water table and thus receive water from the underground reservoir, commonly are called gaining, or effluent, streams. During periods of high flow, water is stored temporarily in the sand and gravel that flank the river. This water drains back into the stream after the flood flow has passed.

Normally, the movement of ground water is from the alluvium toward the river; however, in some places where wells near the river are pumped heavily, the direction of flow is reversed and water moves from the river toward the well. In this way, the river becomes a source of recharge to the ground-water reservoir.

Intermittent streams, such as Bijou, Kiowa, Badger, and Beaver Creeks, which lie above the water table and which, hence, lose water to the ground-water reservoir, commonly are called losing, or influent, streams. The wide sandy beds of these intermittent creeks are dry most of the time, but during periods of heavy rainfall they carry large quantities of water, much of which percolates through the permeable creek beds to the water table. The amount of water that percolates downward to the water table depends on the size and duration of the flood, the amount and type of sediment carried by the flood, and the condition and gradient of the creek bed.

Several floods were observed on Bijou Creek during the investigation and water samples were collected for sediment studies by the Quality of Water Branch of the U. S. Geological Survey, but the complete data on these are not included in this report. The samples collected had a wide range of sediment content and contained as much as 15 percent of sediment by weight. The sediment carried by the water during most of the floods consisted of very fine silt, which retarded downward percolation of water. However, some recharge to the ground-water reservoir occurred; the water level in well B1-15-18cc, about 1,000 feet from Bijou Creek, rose after a week of flooding along the creek. Large floods generally carry a considerable amount of coarse materials and scour the creek bed by turbulence and abrasion and thus increase the rate of recharge. Floods that originate in areas underlain by sand and gravel carry a coarser bed load and have a greater recharge rate than floods that originate in areas underlain by fine-grained materials such as loess and shale.

According to farmers residing in the Beaver Creek valley, the creek has flowed only once in the past several years, whereas previously it flowed several times a year. They attribute the present condition to the many stock ponds that have been constructed in the upper part of the drainage area. Precipitation that would otherwise cause the creek to flow and thus be a source of recharge to the alluvium of the valley now is retained near the place where it falls and is lost, in part, by evaporation. These ponds probably do not contribute much water to the ground-water reservoir; they generally are constructed in areas where the bedrock is at or near the land surface and where the soil is relatively impermeable.

Seepage from flooding along Kiowa Creek probably contributes much water to the ground-water reservoir. Residents in the area report a large downstream decrease in surface flow during floods. This is also indicated by the downstream decrease in the size of the stream bed. At Bennett, Colo., the channel is about 100 feet wide, whereas the channel about 45 miles downstream near Wiggins, Colo., is only a few feet wide. (See fig. 11.) Most of the flood water that passes Bennett is lost to the ground-water reservoir before it reaches Wiggins.

Figure 11. — View of the Kiowa Creek bed showing change in size in the 45-mile reach of the creek from (*A*) Bennett, Colo. to (*B*) 2 miles north of Wiggins, Colo. The decrease in size of the stream channel indicates a large loss of flow due to seepage between the two points.

SUBSURFACE INFLOW

A considerable quantity of ground water moves through the alluvium of the South Platte River valley and of tributary valleys in downvalley directions and enters the project area at the upstream boundaries. Also, a large amount of ground water moves into the alluvium from bordering deposits of dune sand and from the Ogallala formation. Other formations bordering the valley also contribute water to the alluvium but, because of their low permeability, the quantity is small. The total recharge by subsurface inflow is small in comparison to recharge by seepage from irrigation systems.

An estimate of the amount of ground water entering the project area by underflow through the alluvium of the South Platte River valley and of tributary valleys was made by the application of Darcy's law:

$$Q = P I A$$

in which Q = quantity of water in gallons per day passing a valley cross section;
P = coefficient of permeability in gallons per day per square foot;
I = hydraulic gradient of the water table in feet per mile;
and A = cross-sectional area of the saturated part of the alluvium.

The cross-sectional area of the valleys of Lost, Kiowa, Bijou, Sand Arroyo, Badger, and Beaver Creeks was determined by test drilling along a line 5 miles north of the 40th parallel; that of the valleys of Wildcat and Pawnee Creeks from test drilling along lines crossing the valleys near where they enter the South Platte River valley; and that of the Lodgepole Creek valley from test drilling along the Colorado-Nebraska State line. The results of these computations are given in table 3 along with an estimate of underflow through the alluvium of the South Platte River at Hardin, Colo.

The quantity of ground water that moves into the alluvium from bordering dune-sand deposits is believed to be large. The average saturated thickness of the dune sand through which the water percolates is small; however, the deposits cover a large area and are capable of transmitting much water.

The Ogallala formation borders the alluvium of the South Platte River valley on both sides of the valley for about 50 miles upstream from Paxton, Nebr. The formation has a relatively high

Table 3.—*Ground-water inflow into the South Platte River valley project area through the alluvium of the South Platte River valley and its tributary valleys*

Valley	Cross-sectional area of the saturated part of the alluvium, in mile-feet	Approximate ratio of sand and gravel to the saturated part of the alluvium	Approximate average coefficient of permeability of the sand and gravel, in gallons per day per square foot.	Downvalley gradient of the water table, in feet per mile	Ground-water inflow, in cubic feet per second
Lost Creek	203	0.90	2,090	18	10.7
Kiowa Creek	64	.90	2,000	25	4.5
Bijou Creek	401	.80	1,040	18	9.3
Sand Arroyo Creek	37	.50	1,000	10	.3
Badger Creek	45	.60	1,000	20	.8
Beaver Creek	196	.90	2,900	15	11.9
Wildcat Creek	31	.50	1,000	28	.7
Pawnee Creek	26	.80	1,000	20	.6
Lodgepole Creek	20	.95	2,000	14	.8
South Platte River at Hardin, Colo	....	....	....	....	10
Total	....	....	....	....	49.6

permeability and a considerable saturated thickness; it probably transmits a large quantity of ground water to the alluvium of the valley.

QUANTITY OF WATER IN STORAGE

Most of the recoverable ground water that is stored in the South Platte River valley project area is in the alluvial deposits of the valley fill. Practically all the ground water that is available for irrigation is in these deposits.

The approximate quantity of ground water in storage in the alluvium was determined by multiplying the volume of material saturated by an assumed coefficient of storage of 0.20. The volume of saturated material in most of the project area was computed from the saturated-thickness map (pl. 4); that of a part of the South Platte River valley between Hardin and Weldona, Colo., was estimated because sufficient data were not available to construct a saturated-thickness map of that part of the area.

An estimate of the quantity of ground water that is represented by each foot of rise or decline of the water table was computed on the basis of the present position of the water table. These computations and the computations of the amount of water in storage are given in table 4. For convenience in computing the data, the South Platte River valley project area was divided into eight subareas. (See fig. 9.)

The estimated quantity of ground water in storage, shown in table 4, does not include all the ground water in storage within the project area but is intended to give only the following information: (1) The approximate quantity of ground water in storage in the valley fill that could be removed by pumping if all the alluvium in the area could be drained by gravity into wells, and (2) the approximate quantity of ground water represented by each foot of rise or decline of the water table under present hydrologic conditions.

Table 4.—*Quantity of ground water in storage in the alluvium of the South Platte River valley.*

[Based on the estimated area and volume of the saturated part of the alluvium and an estimated storage coefficient of 0.20]

Area	Quantity of ground water represented by 1 foot rise or decline of the water table, in acre-feet	Quantity of ground water in storage that could be drained out under ideal conditions, in acre-feet
Prospect Valley area, Colorado	16,400	940,000
Hardin to Weldona, Colo	18,800	1,420,000
Valleys of Bijou and Kiowa Creeks, Colorado	34,600	2,884,000
Fort Morgan area, Colorado	15,000	1,029,000
Beaver Creek valley, Colorado	13,400	584,000
Brush to Sterling, Colo	25,100	2,063,000
Sterling, Colo., to Colorado-Nebraska State line	29,700	2,197,000
Total for area within Colorado	153,000	11,117,000
Colorado-Nebraska State line to Paxton, Nebr	21,600	1,596,000
Total for project area in Colorado and Nebraska	174,600	12,713,000

GROUND-WATER DISCHARGE

Ground-water discharge is the withdrawal or loss of water from the ground-water reservoir. Water may be removed by transpiration and evaporation, by flow into streams, springs, and seeps, by underflow that leaves the area, and by pumping from wells. These methods of discharge operate singly or in combination in all parts of the area. Over a period of years, the quantity of ground-water discharge is approximately equal to the quantity of recharge to the ground-water reservoir. The quantity of water that leaves the area by underflow is approximately equal to the amount that enters by underflow through the alluvium of the South Platte River valley at Hardin, Colo., or about 10 cfs. (See table 3.)

TRANSPIRATION AND EVAPORATION

Water taken into the roots of plants directly from the zone of saturation or from the capillary fringe above it is discharged by transpiration. Water that is brought to the land surface by capillary action is discharged by evaporation. The depths from which plants lift ground water differ greatly with the plant species, with the types of soil, and with the conditions of water supply. Investigations show that certain kinds of plants lift ground water from depths of 50 feet or even more (Meinzer, 1923b, p. 48). No attempt has been made to estimate the quantity of ground water discharged by transpiration and evaporation in the project area, but it is believed to be large.

In a large part of the South Platte River valley project area, the water table is less than 20 feet below the land surface. (See pl. 3.) Most of the discharge of ground water by transpiration occurs in this part of the area. Grasses are the principal users of ground water in waterlogged areas, and cottonwood and willow trees are the chief users in those parts of the river and creek bottoms that are not waterlogged.

Where ground water is discharged from the land surface by evaporation, a residue of mineral matter generally is left at the land surface. The depth from which water may be brought to the land surface by capillarity depends upon the character of the material above the water table—the finer the material, the greater the distance the water will rise. Probably very little water is drawn to the land surface by soil capillarity where the depth to water is more than 10 feet.

Evaporation of ground water from the land surface occurs mostly in the low, flat areas that are adjacent to the river and in areas that are near reservoirs and canals. The accumulation of alkali on the land surface at many places in the valley, especially in the vicinity of Iliff, Proctor, Crook, and Sedgwick, Colo., indicates waterlogging and the consequent discharge of ground water from the land surface by evaporation.

STREAMS, SPRINGS, AND SEEPS

Streamflow at low stages in the South Platte River, in Lodgepole Creek, and in the lower reaches of Bijou, Beaver, Wildcat, and Pawnee Creeks, is maintained by ground-water discharge. Water is discharged into these streams mainly through springs and seeps along the stream channels. Trees and other vegetation along the stream courses intercept much of the water that otherwise would be discharged into the streams but, if the supply of ground water is greater than the amount required by these plants, the excess contributes to the flow of the streams.

Much ground water also is discharged into land drains that have been constructed in waterlogged areas, especially on the valley floor north of the South Platte River between Sterling and Ovid, Colo. Water flows continually in most of these drains but the flow is greater during and after the irrigation season. The flow in these drains contributes to the flow in the South Platte River.

The ground water discharged into the South Platte River generally is called return flow by local engineers, on the assumption that most of it is derived from seepage from canals, reservoirs, and irrigated land. Parshall (1922, p. 26) stated—

> . . .it is thought that the South Platte River, especially in the valley between the mouth of the Cache la Poudre River and the Nebraska State line, accumulates more return water than any other stream in Colorado. This return flow to the river at the time when irrigation was first practiced in the late sixties must have been small, and not sufficient to attract the attention of irrigators. Prior to about 1885, the return flow to the South Platte River had assumed such proportions as to cause comment, and was of sufficient importance that new canals were constructed to take advantage of this interesting condition. After the passage of the Irrigation District Law in 1901, a number of projects were proposed for the Platte Valley, and during the period of promotion many experienced engineers looked upon these schemes with considerable apprehension as to the possible water supply. Since their construction it now becomes apparent, however, that in average years there is an ample supply during the growing season.

Parshall (1922, p. 45-72) determined the return flow to the South Platte River between Kersey, Colo., and the Colorado-Nebraska State line for several periods of time. The return flow for the period 1890-94 was 195 cfs; for the period 1910-14, 700 cfs; and for the period 1919-20, 750 cfs. The increase in return flow between 1890 and 1920 was due to an increase in the development of irrigation in the area. The amount of return flow to the South Platte River for the period 1919-20 ranged from 2 to 8.5 cfs per mile for different sections of the river and averaged 5.25 cfs per mile. The discharge of ground water into the river at the present time probably is about the same as that in 1920, as the irrigated area has not increased appreciably since then.

In addition to the springs and seeps along the stream channels, a few other gravity springs are present along the edge of the valley. Although the quantity of water discharged from these springs and seeps is small in comparison to that discharged from springs and seeps along stream and drain channels, it is sufficient for the watering of livestock. Most of the springs are near the contacts between the relatively impermeable Pierre shale and the overlying sandstone, alluvium, or dune sand. Most of the springs and seeps are below canals; this indicates that the water is derived from canal and irrigation seepage losses, although some of the springs and seeps may have existed before the canals were constructed.

WELLS

In the South Platte River valley project area, ground water is pumped for irrigation, municipal, stock, domestic, and industrial uses—listed in what is believed to be the order of quantity pumped. More water is pumped for irrigation than for all other uses combined. The quantity of water pumped for each of the different uses, insofar as known, is given on pages 68–52, and the effect of pumping on the position of the water table is discussed on pages 43–52.

When water is pumped from a well, the water level in the well is lowered, and the amount of depression is called the drawdown of the well. The rate of pumping in gallons per minute per foot of drawdown is called the specific capacity of the well. Under water-table conditions, the specific capacity is constant only when the drawdown is a small fraction of the saturated thickness of the aquifer; the specific capacity varies also with differences in the construction and development of wells. However, a comparison of specific capacities is useful in the estimation of the relative efficiency of wells and of the permeability of formations. In this area, drawdowns of irrigation wells that yield about 1,000 gpm range from about 4 to 40 feet; their specific capacities, therefore, range from 250 to 25. The drawdown is also inversely proportional to the permeability of the water-bearing material; hence, the drawdown generally is small in wells that obtain water from well-sorted gravel and coarse sand and it is much greater in wells in less permeable materials such as fine sand, silt, or clay.

When a well is pumped, the water table in the vicinity of the well declines and takes a form similar to that of an inverted cone; this is called the cone of depression. The pumping level in the well is at the apex of the cone, and the slope of the cone is greatest near the well and is increasingly less at greater distances from the well. The distance to the point where the drawdown is imperceptible is called the radius of influence and the circular area described by this radius is called the area of influence of the well. If the discharge of the well is increased, the drawdown and area of influence also are increased.

Most of the wells in the South Platte River valley project area are drilled wells that range in diameter from 4 to 48 inches and are cased with steel casing. A few dug wells, ranging from 4 to 10 feet in diameter and cased with concrete, brick, or wood curbing, have been constructed for domestic and stock use. A few small-diameter driven wells, ranging from about 1 to 2 inches in diameter, have been installed for stock and domestic use at places where the water table is near the land surface.

DRILLING METHODS

Most of the wells in the South Platte River valley were drilled by either the cable-tool, standard hydraulic-rotary, or reverse-rotary method. Both small- and large-diameter wells and test holes are drilled by the cable-tool method, whereas the standard hydraulic-rotary method generally is limited to small-diameter wells and test holes, and the reverse-rotary method is limited to large-diameter wells.

Cable-tool method.—The cable-tool method of drilling (sometimes referred to as the percussion or churn-drill method) is done by means of a string of solid drilling tools operated in the drill hole on the end of a cable that is lifted and dropped regularly to produce a cutting or drilling action at the bottom of the hole. The material is removed from the bottom of the hole by means of a bailer or a sand bucket. Generally, a casing is forced into the hole as the drilling proceeds and the bailer or sand bucket is lowered and withdrawn through the casing.

In drilling large-diameter wells, such as irrigation, public-supply, or industrial wells, by the cable-tool method, a temporary steel casing about 48 inches in diameter is used. The material above the water table is excavated by hand or by an orange-peel bucket. When the water table is reached, the sand bucket is used to drill the remainder of the well. The temporary casing, weighted by sand bags, is forced into the hole. When the drilling is complete, a perforated casing is placed within the temporary casing, the annular space between the casings is packed with gravel, and the temporary casing is removed.

Standard hydraulic-rotary method.—Most of the small-diameter wells in the South Platte River valley have been drilled by the standard hydraulic-rotary method (sometimes called the standard-rotary method). Holes ranging from 4 to 14 inches in diameter are drilled by this method. Drilling is done by rotating the drilling bit at the bottom of the drill stem. During the process of drilling, water is circulated from a pump downward through the slowly revolving drill stem and bit into the bottom of the hole and then upward to the land surface into a sump pit, where the water is taken by the pump and recirculated. Materials drilled from the bottom of the hole are carried to the surface by the circulating water. Mud, clay, or some manufactured product is sometimes added to the water to increase its viscosity and material-lifting capacity and also to seal the hole to prevent caving and to prevent the loss of drilling water by seepage into permeable materials. In the area described in this report all the water wells drilled by the standard hydraulic-rotary method are less than 400 feet deep, although much greater depths have been reached in test drilling for oil.

Reverse-rotary method.—The standard hydraulic-rotary method of drilling generally is limited to holes of small diameter, because of the difficulty of providing enough discharge water in the drill hole to maintain sufficient velocity to carry the drill cuttings to the land surface. This disadvantage has been overcome in the reverse-rotary method of drilling by reversing the direction of the circulating water—hence, the name "reverse rotary." In the reverse-rotary method, the water is pumped up the hollow drill stem and discharged into a settling pit where the drill cuttings remain. The water runs back to the drill hole by gravity. Enough water is provided to keep the drill hole full at all times so that the hydrostatic pressure will prevent caving. A slowly revolving bit at the lower end of the drill stem cuts the material loose and the circulating water carries it through the pump to the settling pit. Holes that range from 18 to 60 inches in diameter and that are as much as 250 feet deep have been drilled by this method in the South Platte River valley. Mud, clay, or a manufactured product is sometimes added to the circulating water to add to its viscosity and to seal the hole to prevent caving and the loss of drilling water by seepage. Figure 12 shows a 32-inch drilling bit.

Most of the reverse-rotary drilling rigs that are used in the South Platte River valley were made from automobile trucks and engines and from parts that were designed and made in the different drillers' machine shops.

IRRIGATION WELLS

CONSTRUCTION METHODS

Irrigation wells were first constructed in Beaver Creek valley in 1910; in the South Platte River valley, near Hillrose, Colo., in 1913; and in Bijou Creek valley in 1915. The early irrigation well consisted of a reinforced pit that was constructed to the water table and a hole of small diameter that extended below the bottom of the pit. A centrifugal pump was placed in the pit above the water table. As this type of well would not operate when the drawdown became too great for the suction lift of the pump, several other wells were drilled nearby and were connected to the pumped

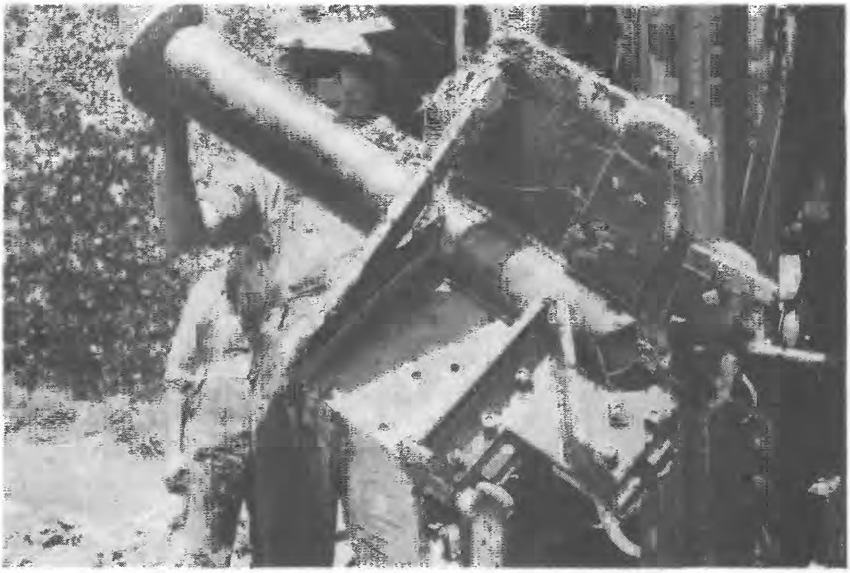

Figure 12.—A 32-inch drilling bit used in reverse-rotary drilling.

well by buried siphons, thereby reducing the drawdown and increasing the water supply. The pit type of well was successful in the South Platte River valley where the depth to water generally was less than 25 feet, but was unsuccessful in Bijou Creek valley where depths to water generally were more than 50 feet. Many of these early wells are still in operation.

Since about 1935, most of the irrigation wells have been constructed by drilling into or through the water-bearing formation, lowering a perforated metal casing (generally 18 inches in diameter) into the hole, and packing the annular space around the casing with clean screened gravel. Such a well is called a gravel-packed well. The perforated parts of the casing generally are placed below the water table at positions that correspond to the more permeable zones in the water-bearing formation, and care is taken to omit perforations and gravel packing in zones of silt and fine sand. The gravel used in packing wells generally is uniform in size and is slightly larger than the casing perforations, which generally are of the "eyelid" type. Where the water-bearing materials are relatively fine, the wells are packed with a fine gravel or a coarse sand. A concrete pumphouse foundation and floor generally are constructed level with the top of the well casing. A 6-inch hole through the concrete floor at the side of the casing is sometimes provided so that the well owner can add to the gravel pack in case it settles as a result of pumping fine-grained material from the aquifer.

Upon completion, the well is tested to determine the yield and the drawdown and a pump is then installed with its intake at a reasonable distance below the point of drawdown. If in later years, the water table declines so that the drawdown reaches the pump intake and the well "pumps air," the pump intake is lowered.

METHODS OF LIFT

Pumps.—Two types of pumps, turbine and centrifugal, are used on irrigation wells in the South Platte River valley; most, including nearly all those installed since 1935, are turbine pumps. The impellers of the turbine pump are submerged below the water table and, hence, do not require priming before operation. A torsion shaft, held by bearings within the water column of the pump, connects the impellers directly to the electric motor, gear head, or pulley at the top of the pump. When the shaft and impellers are rotated, water is pumped directly up the water column and into the discharge pipe. Some pumps are lubricated with oil, others with water. Turbine pumps used in the area range in size (diameter of the water column) from 4 to 12 inches, although most of the pumps are 6, 8, or 10 inches. Measured discharges of turbine pumps in the area range from about 200 to 1,700 gpm.

Centrifugal pumps are used in most of the older wells in Beaver Creek valley and in the South Platte River valley between Brush, Colo., and Ogallala, Nebr., where the depth to water generally is not more than 25 feet. The pumps are set in pits; water is taken into the pumps through an intake suction pipe and pumped out of the pits to the land surface through a discharge pipe. The pumps sometimes require priming before operation and fail to operate if drawdowns exceed the suction lifts of the pumps. Most of the centrifugal pumps in the area are of the horizontal-shaft type, although a few vertical-shaft centrifugal pumps are in operation.

Power.—Pumps in irrigation wells in the area are driven by electric motors or internal-combustion engines that use diesel oil, gasoline, or butane gas for fuel. The power needed for pumping water from a well is proportional to the rate of pumping and to the height that the water is lifted to the point of discharge.

About 71 percent of all the irrigation wells in the area are equipped with electric motors. Electric power is supplied by the Morgan County Rural Electric Association, the Highline Rural Electric Association, the Public Service Company of Colorado, and the Public Power Districts of Nebraska. Power is transmitted at moderately high voltage to a bank of transformers near each pumping plant where it is stepped down to 220 volts for use. Practically all pump motors use 3-phase alternating current, although a few use single-phase current. The size of the motor used depends on the pumping lift and the rate of discharge of the pump. In parts of the area where the depth to water is about 20 feet, electric motors of 10 to 25 hp (horsepower) are employed. Near Fort Morgan, Colo., where the depth to water is about 45 feet, 30- and 40-hp motors are used; north of Wiggins, Colo., where the depth to water is about 75 feet, 50-, 60-, and 75-hp motors are used.

The power input of some pumping plants was measured by timing the rotating disk in the watt-hour meter with a stopwatch. The power input was determined by the equation:

$$H = \frac{3{,}600\ N \times Kh}{746\ t}$$

in which H = power input, in horsepower;

Kh = a constant for each watt-hour meter (generally stamped on the name plate of the instrument) giving the number of watt-hours represented by one revolution of the rotating disc in the meter;

and t = time required, in seconds, for the rotating disc to make N revolutions.

Data on the amount of the power input of 650 pumping plants in the area were furnished by the Morgan County Rural Electric Association. Estimates of the quantity of water pumped (tables 5 and 6) and of the average efficiency of pumping plants (table 7) in selected areas were made on the basis of these data.

Stationary diesel and gasoline engines are used for 12 percent of the irrigation wells in the area. Compared to electric motors, these engines have both advantages and disadvantages. The advantages are (1) greater power may be applied for pumping when additional water is needed, (2) the engine will not be shut off by nearby lightning nor is it subject to electric-power failure, and (3) the engine can be used in places where electric power is not available. The disadvantages are (1) the initial cost of the engine is greater, and (2) the operation and maintenance costs are greater. The power costs for diesel engines and electric motors are reported by well owners to be about the same. Power costs for gasoline engines are reported to be greater. A few stationary engines in the area use butane (bottled) gas, but no data regarding their cost of operation were obtained.

Tractor engines are used for power to pump water from about 17 percent of the irrigation wells in the project area; the power is transmitted from the tractor to the pump by means of a belt drive. The tractor has the same advantages and disadvantages as the stationary engine but has the additional advantage that it can be used for other purposes.

UTILIZATION OF GROUND WATER

All known irrigation, public-supply, and industrial wells in the area, totaling 1,266, were visited and all available data concerning them were obtained. No attempt was made to inventory all the domestic, stock, and unused wells, but data were collected on some of them in areas where information was needed for the study. Pertinent data on the 1,767 wells that were inventoried during the investigation are given in Appendix C, and locations of the wells are shown on plate 3.

DOMESTIC AND STOCK SUPPLIES

Most of the residents of rural areas and small towns derive their supplies of domestic and stock water from small-diameter drilled wells, which are equipped with cylinder pumps operated either by windmill or by hand. Some domestic wells, where electric power is available, are equipped with cylinder or jet pumps that pump water into pressure systems. Water for domestic and stock use is obtained from the alluvial deposits of the stream valleys, from dune-sand deposits, and from the Ogallala, Brule, Chadron, Laramie formations, Fox Hills sandstone, and Pierre shale. Most of the domestic and stock wells are in the alluvial deposits, dune-sand deposits, and the Ogallala formation.

Most of the domestic and stock wells were drilled only deep enough into the water-bearing formations to obtain a sufficient supply of satisfactory water. For this reason and because logs of such wells generally are not available, no attempt was made to inventory all the domestic and stock wells in the area. Records of domestic and stock wells were obtained only for localities where few or no irrigation wells were present and where additional information was needed on the position of the water table or the boundaries of the ground-water reservoir.

The ground water in the area differs greatly in chemical character but generally is satisfactory for domestic use. Water obtained from dune-sand deposits, the Ogallala formation, and the

Pierre shale generally is softer than water obtained from the alluvium.

PUBLIC SUPPLIES

Thirteen municipalities in the South Platte River valley project area obtain water from wells. The average daily consumption of these 13 communities aggregates about 4,000,000 gallons. The public-supply systems are described below in downstream order from Fort Morgan, Colo., to Paxton, Nebr.

FORT MORGAN, COLO.

Fort Morgan (population 5,296) is supplied from six gravel-packed drilled wells (B3-57-6ac, B3-57-6bd, B3-57-6cd, B3-57-6db, B3-58-1da1, and B3-58-1da2) within the city limits. The wells range in depth from 175 to 250 feet and are reported to be drilled to, or nearly to, the Pierre shale. The wells tap the alluvium of the South Platte River valley and their yields are reported to range from 900 to 1,300 gpm and their drawdowns from 9 to 14 feet. The wells are equipped with electrically driven turbine pumps that pump water directly into the mains and force reserve water into a 235,000-gallon steel standpipe, which maintains an average operating pressure of 40 psi (pounds per square inch) at the base of the standpipe and an average pressure of 36 psi at service outlets. The annual consumption in 1950 was 688,483,000 gallons, which is equivalent to about 1,350 gpm. Water is sold to the local sugar-refining plant during October, November, and December of each year for use in the production of sugar from locally grown sugar beets. Water is sold also to several smaller industries, including an ice plant and two creameries. The water is hard, as is indicated by the results of the analysis of a water sample from well B3-57-6bd (appendix D), but is not treated.

BRUSH, COLO.

Brush (population 2,429) is supplied from three gravel-packed drilled wells (B3-56-3aa, B3-56-3ad, and B3-56-3da) within the city limits; the wells are equipped with electrically driven turbine pumps and yield about 500 gpm each. The wells, which range in depth from 85 to 99.5 feet, obtain water from the sand and gravel of the alluvium. The water is pumped from the wells directly into the mains and is forced into a 100,000-gallon elevated steel tank. An average pressure of 42 psi is maintained. The maximum recorded consumption of water was 23,918,000 gallons during July and the minimum was 8,266,000 during January. The average monthly consumption is about 15,000,000 gallons. The daily use of water during the peak month averaged 771,500 gallons which is equivalent to about 535 gpm. The water is hard but is not treated. The results of an analysis of a sample of the water from well B3-56-3da is shown in appendix D.

At the present time (1951) a new well field for the city of Brush is being developed and is scheduled for use this summer. It is 4 miles south of Brush and will be connected by pipeline to the present city water-distribution and pressure system. Water will be obtained from sand and gravel in alluvium that is overlain by dune sand. One gravel-packed drilled well (B3-56-26bb), 112 feet deep, has been completed and another is scheduled for immediate construction. The results of an analysis of a sample of the water from well B3-56-26bb are shown in appendix D.

An area that included the proposed well field was investigated by the U. S. Geological Survey as part of the South Platte River valley project study. A report on the quantity and quality of water available in the area was prepared by the Geological Survey and published by the Colorado Water Conservation Board (Brown, 1950).

MERINO, COLO.

Merino (population about 300) has been supplied since 1919 from a gravel-packed drilled well (B6-54-13da) within the town limits. The well is 70 feet deep and obtains water from sand and gravel of the alluvium. It is equipped with an electrically driven centrifugal pump that pumps water directly into the mains and into a 35,000-gallon elevated steel tank directly above the well. The well is reported to yield 400 gpm with a drawdown of 3 feet. The water is hard (see results of the analysis of water from well B6-54-13da in appendix D) but is not treated.

STERLING, COLO.

Sterling (population 7,470) is supplied from eight gravel-packed drilled wells (B8-52-27dc, B8-52-34ab, B8-52-34ac, B8-52-34ca, B8-52-34cb2, B8-52-34bd1, B8-52-34cc1, and B8-52-34cc2) in a sand-hill area across the South Platte River from the city. The wells are drilled to shale and range in depth from 71 to 114 feet. Two more city wells are scheduled for construction in the well-field area. Water is derived from alluvium overlain by dune sand.

Each of the wells is reported to yield about 400 gpm with a drawdown of about 15 feet. Electrically driven turbine pumps force the water directly into a supply line that transmits the water into the city. Two 250,000-gallon elevated steel storage tanks, which are at opposite sides of the city, are connected to the city mains. An average pressure of 50 psi is maintained in the water-distribution system. Daily consumption ranges from 900,000 gallons during January to 2,500,000 gallons during August. Water is sold to the local sugar refinery during October, November, and December of each year for use in the local beet-sugar factory. The results of an analysis of a sample of water from well B8-52-34ac are shown in appendix D. Water in the city system is chlorinated.

Between 1920 and 1941 Sterling obtained its water supply from a battery of 28 closely spaced wells (B8-52-34b) in the sand hills about 1,000 feet southeast of the South Platte River. Water was derived from alluvium overlain by dune sand and was pumped from a siphon system that connected the 28 wells. At first, the water was soft because its natural movement had been from the dune-sand area toward the river. Pumping, however, lowered the water table in the vicinity of the battery of wells and reversed the direction of ground-water movement between the wells and the river. The movement of water of poor quality from the river towards the well field caused the city supply to become progressively harder. Regular use of the well field was discontinued in 1941 (it is now reserved for emergency use) when the present field was developed. The eight wells now in regular use are about 2,000 to 4,000 feet from the river. Pumping has caused the water in these wells also to become progressively harder, but to a lesser degree than in the older field. On the water-table contour map of the area (pl. 3), an area of depression that is lower than the altitude of the adjacent river surface indicates that water is moving from the river toward the wells.

ILIFF, COLO.

Iliff (population about 350) is supplied from a gravel-packed drilled well (B9-51-16ab1) within the town limits. The well is 70 feet deep, is drilled to the Pierre shale, and obtains water from sand and gravel in the alluvium of the South Platte River valley. An electrically driven turbine pump at the well discharges water directly into the distribution system at a rate of 100 to 150 gpm. A 35,000-gallon elevated steel tank directly above the well is used for storage. The water table in the vicinity of the well is only 5 feet below the land surface. The water is very hard and of poor quality (see results of the analysis of a sample of water from well

B9-51-16ab1 in appendix D) and is not treated. Some of the town residents obtain a soft but somewhat highly mineralized water (see results of the analysis of a sample of water from well B9-51-16ab2 in appendix D) from deep wells in the Pierre shale.

CROOK, COLO.

Crook (population about 225) is supplied from a gravel-packed drilled well (B10-49-11cb) within the town limits. The well is 55 feet deep and obtains water from sand and gravel in the alluvium of the South Platte River valley. An electrically driven turbine pump at the well pumps water directly into the distribution mains. A 52,000-gallon elevated steel storage tank connected to the distribution system near the well stores reserve water and helps to maintain an average operating pressure of 60 psi. The average daily consumption is about 75,000 gallons. The depth to the water table in the vicinity of the well is less than 5 feet. The water is hard (see the results of the analysis of a water sample from well B10-49-11cb in appendix D) but is not treated other than by chlorination.

SEDGWICK, COLO.

Sedgwick (population about 500) is supplied from a battery of seven closely spaced dug and drilled wells (B11-46-20cb) in the sand hills south of the South Platte River. Water is derived from alluvium overlain by dune sand. The seven wells are connected by a siphon and the water is pumped from the center well by means of an electrically driven centrifugal pump. Reserve water is stored in a 50,000-gallon elevated steel tank within the town limits, and an average operating pressure of 55 psi is maintained. Monthly consumption ranges from 900,000 gallons during January to 2,700,000 gallons during August. Annual residential consumption is about 19,000,000 gallons; an additional 7,000,000 gallons a year is sold to the Union Pacific Railroad Co. for use in locomotive boilers. The water is relatively soft, as is indicated by the analysis of water from well B11-46-20cb shown in appendix D, largely because the recharge is from local precipitation in the sand hills south of the wells. A previously used battery of three wells within the town limits (B11-46-18ba2) obtains hard water from sand and gravel in the alluvium of the river valley and is now reserved for emergency use only.

OVID, COLO.

Ovid (population about 690) is supplied from a battery of four drilled wells (B12-45-29ad) that are 2 miles north of the town. The wells are 100 feet deep and are drilled through about 36 feet of the alluvium of Lodgepole Creek valley and about 64 feet of the underlying Brule formation. The Brule formation is reported to be fractured or porous and to yield water in moderate to large quantities. The wells derive water from both the alluvium and the fractured Brule formation. The water table is about 11 feet below the land surface. Water is pumped by an electrically driven centrifugal pump from a siphon pipe, which is common to the four wells, into a pipeline connected to the town water system. Reserve water is stored in a 50,000-gallon elevated steel tank within the town limits and an operating pressure of 55 psi is maintained. The average monthly residential consumption is about 3,000,000 gallons. About 250,000 gallons a month is sold to the local sugar refinery during October, November, and December of each year, and as much as 60,000 gallons a month is delivered to stock yards in the town. The water, though moderately hard, is soft in comparison to that generally found in the alluvium of the South Platte River valley. The results of the analysis of a sample of water from well B12-45-29ad are given in appendix D. The water is not treated.

JULESBURG, COLO.

Julesburg (population 1,983) is supplied from three drilled wells (B12-45-26ab1, B12-45-26ab2, and B12-45-26bd) about 3 miles northwest of the city. The wells range in depth from 81 to 85 feet and water is derived from the dune-sand covered alluvium of the South Platte River valley. The yield of the wells ranges from 200 to 240 gpm and the drawdowns from 4 to 10 feet. Each well is equipped with an electrically driven turbine pump that pumps the water directly into a pipeline to the city. A reserve supply of water is forced into a 140,000-gallon steel standpipe at the well field and an average operating pressure of 50 psi is maintained. The monthly consumption of water ranges from about 8,000,000 gallons in January to about 17,000,000 gallons in August and averages about 10,000,000 gallons, which includes 5,000,000 gallons sold to the Union Pacific Railroad Co. for use in locomotives. A well within the city limits (B12-44-28ca), formerly used for municipal supply, now is reserved for emergency use.

The water is relatively hard but is not treated except by the railroad company for use in locomotives. The results of an analysis of a sample of water from well B12-45-26ab1 are given in appendix D.

Prior to 1935, Julesburg was supplied from wells that were within the city limits. The water, derived from the alluvium of the South Platte River valley, was very hard. The present well field was developed between 1935 and 1939 in an area where the alluvium contained softer water (about 180 ppm). Since the development of the well field, the withdrawal of ground water has created a water-table depression deep enough to cause ground water to move into the well field from the main body of alluvium in the South Platte River valley; as a result, the hardness of the water in the city supply has increased to 336 ppm. An investigation of the general area was made by the U. S. Geological Survey early in 1948, and a report on the quantity and quality of ground water in the area (McLaughlin, 1948) was prepared by the Geological Survey and published by the Colorado Water Conservation Board. Data collected during McLaughlin's investigation have been incorporated in this report.

BIG SPRINGS, NEBR.

Big Springs (population 530) is supplied from two drilled wells within the town limits. These wells are only 25 feet apart and, therefore, are numbered as a single well (B13-42-25dd1) in this report. Both are 29 feet deep and derive water from the alluvium of the South Platte River valley and the Ogallala formation. The wells are equipped with electrically driven turbine pumps. Reserve water is pumped into a 52,000-gallon elevated steel tank that is connected to the distribution system and an operating pressure of 50 to 60 psi is maintained. No record of water consumption is available. The water is soft, as is indicated by the results of the analysis of water from well B13-42-25dd1 given in appendix D.

BRULE, NEBR.

Brule (population 320) is supplied from a gravel-packed drilled well (B13-40-15db) within the town limits. The well is 125 feet deep and derives water from the alluvium. The well is equipped with a turbine pump driven by a 15-hp electric motor; it yields 220 gpm and the drawdown is 8 feet. Water is pumped directly into the town mains and a reserve supply is forced into a 30,000-gallon elevated steel tank; an operating pressure ranging from 50 to 60 psi is maintained. Monthly consumption of water ranges from 200,000 gallons in midwinter to 600,000 gallons in midsummer and the average monthly consumption is about 400,000 gallons. The well and water-distribution system were constructed during 1950 but were not used until late that year. The system was not completed at the time samples of water from municipal water systems were collected. The water is reported to be moderately soft and is believed to be similar to the water from well B13-40-22aa, an irrigation well about 1,500 feet southeast of the Brule well. The relative softness, compared to that of most of the ground water from the alluvium of the South Platte River valley, is believed to be due to ground-water inflow from the adjacent Ogallala formation. The water is not treated.

OGALLALA, NEBR.

Ogallala (population 3,440) is supplied with water from two drilled wells (B13-38-6ca2 and B13-38-6da) within the city limits. Both wells are 187 feet deep, are drilled to the Brule formation, and obtain water from both the alluvium of the South Platte River valley and the Ogallala formation. Each well is equipped with an electrically driven turbine pump; the yield of each is reported to be 800 gpm and the drawdown about 25 feet. Water is pumped directly into the city mains and a reserve supply is forced into two steel tanks situated on a hill north of the city. The tanks have a combined storage capacity of 200,000 gallons, and an average operating pressure of 60 psi is maintained. Some of the water is used in railroad locomotives. The water is relatively soft in comparison to most of the water in the alluvium of the South Platte River valley; this is probably due to the admixture of water from the Ogallala formation. The results of an analysis of a sample of water from well B13-38-6ca2 are shown in appendix D.

PAXTON, NEBR.

Paxton (population 610) is supplied from two drilled wells within the town limits. As these wells are only 50 feet apart, they are numbered as a single well (B13-35-5ca) in this report. The wells are 109 feet deep and tap both the alluvium of the South Platte River valley and the Ogallala formation. The Ogallala formation is recharged by inflow from the overlying alluvium, and the alluvium in the vicinity of the wells is recharged by seepage from the South Platte River. (See water-table contour data, pl. 3.) The wells are equipped with electrically driven turbine pumps that force water into the mains at the rate of about 350 gpm. A reserve supply of water is forced into a 50,000-gallon elevated steel tank and an average operating pressure of 55 psi is maintained. No record of water consumption is available. The water

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from the wells is hard, as is indicated by the results of the analysis of a sample of water from well B13-35-5ca in appendix D, but is not treated.

TOWNS SUPPLIED BY PRIVATELY OWNED DOMESTIC WELLS

Many of the small towns in the lower South Platte River valley between Hardin, Colo., and Paxton, Nebr., are supplied by privately owned domestic wells. The wells generally are drilled by the standard hydraulic-rotary method and cased with perforated steel casing. Some of the wells are equipped with hand-operated cylinder pumps and some—those connected to domestic pressure systems—are equipped with electrically driven cylinder or jet pumps.

In downvalley sequence from Hardin, Colo., to Paxton, Nebr., the principal towns supplied by privately owned domestic systems are Hardin, Roggen, and Masters in Weld County, Colo.; Hillrose and Snyder in Morgan County, Colo.; Atwood and Proctor in Logan County, Colo.; and Roscoe in Keith County, Nebr. These towns, with the exception of Roggen and Roscoe, obtain all their water from wells tapping the alluvium of the South Platte River valley. Most of the wells in Roggen tap the alluvium, but one small flowing well (B2-62-6ca) in Roggen yields soft water derived from the underlying Fox Hills sandstone. The residents of Roscoe obtain water from wells tapping either or both the alluvium and the Ogallala formation. Water derived from the alluvium is hard compared to water derived from the Ogallala formation.

POSSIBLE FUTURE DEVELOPMENT

Any of the towns or cities that obtain water from the alluvium of the South Platte River valley could enlarge their supply substantially without seriously depleting the quantity of available water. In some places, however, the quality of ground water may be affected if withdrawals are increased substantially. Water derived from dune-sand covered alluvium, such as at the new Brush well field and at Sterling, Sedgwick, and Julesburg, Colo., is moderately soft; however, if pumping is heavy, the water may become harder because of induced inflow of ground water from the main body of alluvium in the South Platte River valley or its tributary valleys. This situation has occurred to a limited extent at Sterling and Julesburg, but is less likely to happen at Brush owing to the greater quantity of soft ground water in storage in the well-field area and the greater distance to the areas of hard water.

The towns of Iliff and Crook, Colo., probably could obtain softer water by installing wells south of the South Platte River where the alluvium is recharged by precipitation on dune-sand areas.

Paxton, Nebr., probably could obtain a potable supply of water that is softer than its present supply by drilling wells into the Ogallala formation south of the South Platte River. As the natural movement of ground water in this area is northward toward the North Platte River, most of the water yielded by town wells between the South Platte and the North Platte Rivers is of poor quality because it is derived from the South Platte River. Wells in the Ogallala formation south of the South Platte River would supply water of good quality; the water in the Ogallala in this area is derived mainly from recharge by precipitation to the south. Water similar to that obtained from wells B13-36-16bb and B13-36-20ad (see appendix D) probably could be obtained.

INDUSTRIAL SUPPLIES

Ground water is used by several industries in the lower South Platte River valley. Sugar factories at Fort Morgan, Brush, Sterling, and Ovid, Colo., obtain water from the respective municipal supplies for use in refining sugar. Water for washing beets is diverted from streams but is generally supplemented from wells. The Chicago, Burlington & Quincy Railroad Co. owns and operates wells at Roggen, Brush, and Sterling, Colo. The Union Pacific Railroad Co. pumps water from a well at Sterling and obtains water from the municipalities of Sedgwick and Julesburg, Colo., and Big Springs and Ogallala, Nebr. All the ground water used by railroads is treated to reduce hardness and scale-forming minerals before use in locomotive boilers. Steam plants generating electric power at Fort Morgan and Sterling use ground water to cool the condensers. Ground water is used also by dairies, laundries, and other small industries.

IRRIGATION SUPPLIES

HISTORY OF DEVELOPMENT

The first irrigation wells in the South Platte River valley project area were drilled about 1910. Fourteen irrigation wells in Morgan County and two in Logan County, Colo., are reported by Code (1943) to have been constructed by 1912. Also by that time, some irrigation wells reportedly had been drilled in Weld and Adams Counties, Colo., but it is not known how many of them were in the area covered by this investigation. In Bijou Creek valley, where the first irrigation wells were drilled in 1915, Code (1943) reported 37 wells in 1940, whereas the present investigation shows 188 wells in 1946 and 200 wells in 1947. In Beaver Creek valley, where the first irrigation well was constructed in 1910, Code (1943) reported 53 wells in 1940, and the present investigation shows 109 wells in 1946 and 116 wells in 1947. Of the many additional irrigation wells constructed during recent years, some replaced old wells that had caved, clogged, or become obsolete, but most of them were drilled at new locations.

The cumulative number of irrigation wells in the area from 1910 through 1947, based on reported construction dates of wells, is shown graphically in figure 13. Until about 1930 only a few

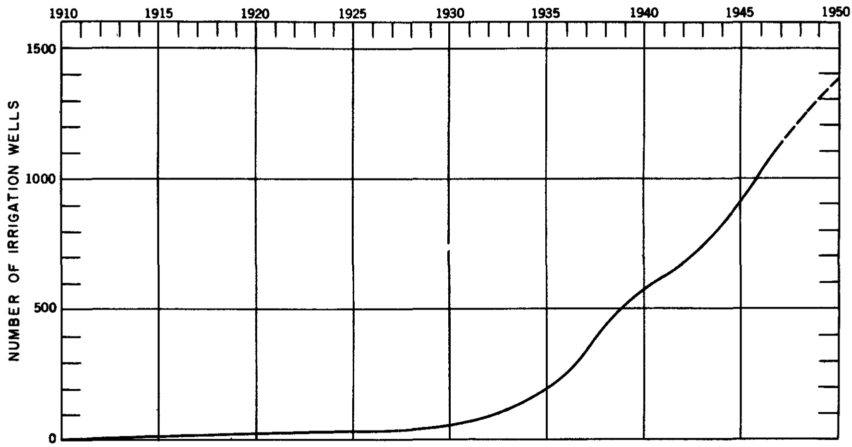

Figure 13.—Cumulative number of irrigation wells constructed in the lower South Platte River valley project area, 1910–50.

irrigation wells had been drilled, and most of these were in the South Platte River valley in areas already being irrigated with river water. Use of ground water for irrigation in the tributary valleys was begun in the early 1930's. At the end of 1947, 1,138 irrigation wells had been drilled. An extrapolation of the curve in figure 13 indicates that about 1,380 irrigation wells were in use by the end of 1950. Not all of these wells are listed in the inventory of wells (appendix C), because the well inventory was completed in 1949. The decrease in well-drilling activity during the period 1940–43 was caused by a shortage of construction materials.

QUANTITY OF WATER PUMPED

The annual pumpage of water in the area was calculated for the period 1946–50 from power-consumption and horsepower-rating records supplied by the Morgan County Rural Electric Association and from rates of well discharge that were measured during the investigation. Discharge measurements were made with a Hoff current meter, which was inserted into the discharge pipe of each pumping plant and while being timed with a stopwatch was moved about in a definite horizontal, vertical, and circular pattern in order to obtain an integrated average velocity of the discharging water. The rate of discharge was then computed by applying the empirically derived formula (Rohwer, 1942, p. 3–40):

$$D = (419\,A - 5)\,V$$

in which D = discharge of the pump, in gallons per minute;
A = cross-sectional area of the discharge pipe, in square feet;
and V = average integrated velocity of the discharging water, in feet per second.

The billed horsepower supplied by the Morgan County Rural Electric Association was 10 percent less than the rated horsepower that had been determined in the field at each plant by measuring power consumption during measured times of operation. The total hours of pumping was calculated for each plant by using the equation:

$$H = \frac{1.207\,KWH}{BHP}$$

in which H = hours pumped;
KWH = kilowatt-hours consumed per year;
and BHP = billed horsepower, which is 10 percent less than rated horsepower.

The quantity of water pumped from wells for which billed horsepower, power consumption, and pump-discharge data were available was computed by using the equation:

$$A = \frac{HD}{5{,}430}$$

in which A = water pumped from well during year, in acre-feet,
H = hours pumped;
and D = pump discharge in gallons per minute, as measured or reported.

The results of the computations described above, grouped under eight areas having relatively uniform hydrologic conditions (see fig. 9) and extrapolated to include all the irrigation wells within the areas, are given in table 5 and summarized in table 6.

Table 5.—*Estimated quantity of water pumped from irrigation wells and acreage irrigated in the lower South Platte River valley, 1946–50*

Year	Number of wells for which computations were made	Acre-feet pumped from these wells	Average quantity pumped per well, in acre-feet	Approximate total number of irrigation wells pumped	Estimated quantity pumped in area, in acre-feet	Number of wells for which irrigated acreage was reported	Total irrigated acreage reported	Average irrigated acreage per well	Estimated irrigated acreage based on total number of wells	Estimated pumpage, in acre-feet per acre
Prospect Valley area, Colorado										
1946....	78	16,717	214.32	111	23,790	107	12,286	114.9	12,754	1.87
1947....	81	12,449	153.69	115	17,674	107	12,286	114.9	13,213	1.34
1948....	92	21,391	232.51	118	27,436	107	12,286	114.9	13,558	2.02
1949....	88	13,330	151.48	120	18,178	107	12,286	114.9	13,788	1.32
1950....	77	21,194	275.25	121	33,305	107	12,286	114.9	13,903	2.40
Hardin to Weldona, Colo.										
1946....	6	770	128.33	22	2,823	20	2,340	117.0	2,574	1.10
1947....	6	625	104.17	28	2,917	20	2,340	117.0	3,276	.89
1948....	9	1,166	129.56	29	3,757	20	2,340	117.0	3,393	1.11
1949....	8	900	112.50	30	3,375	20	2,340	117.0	3,510	.96
1950....	11	2,098	190.73	31	5,913	20	2,340	117.0	3,627	1.63
Valleys of Bijou and Kiowa Creeks, Colorado										
1946....	141	26,752	189.73	233	44,207	219	30,408	138.8	32,340	1.37
1947....	154	28,721	186.50	250	46,625	219	30,408	138.8	34,700	1.34
1948....	185	42,588	230.21	267	61,466	219	30,408	138.8	37,060	1.66
1949....	179	32,992	184.31	272	50,132	219	30,408	138.8	37,754	1.33
1950....	148	38,622	260.96	280	73,069	219	30,408	138.8	38,864	1.88
Fort Morgan area, Colorado										
1946....	38	9,234	243.00	116	28,188	115	19,350	168.3	19,518	1.44
1947....	42	4,820	114.76	130	14,919	115	19,350	168.3	21,879	.68
1948....	47	7,924	168.60	140	23,604	115	19,350	168.3	23,562	1.00
1949....	46	6,247	135.80	145	19,691	115	19,350	168.3	24,404	.81
1950....	34	9,930	292.06	150	43,809	115	19,350	168.3	25,245	1.74
Beaver Creek valley, Colorado										
1946....	54	5,670	105.00	121	12,705	99	9,247	93.5	10,191	1.25
1947....	60	6,197	103.28	129	13,323	99	9,247	93.5	10,939	1.22
1948....	69	10,501	147.84	133	19,663	99	9,247	93.5	11,313	1.74
1949....	68	8,572	126.06	135	17,018	99	9,247	93.5	12,623	1.35
1950....	60	10,583	176.40	138	24,343	99	9,247	93.5	12,903	1.89
Brush to Sterling, Colo.										
1946....	60	9,769	162.82	149	24,260	141	17,460	123.8	18,446	1.32
1947....	62	3,645	58.79	156	9,171	141	17,460	123.8	19,313	.48
1948....	59	7,047	119.44	158	18,872	141	17,460	123.8	19,568	.96

Table 5.—*Estimated quantity of water pumped from irrigation wells and acreage irrigated in the lower South Platte River valley, 1946–50—Continued*

Year	Number of wells for which computations were made	Acre-feet pumped from these wells	Average quantity pumped per well, in acre-feet	Approximate total number of irrigation wells pumped	Estimated quantity pumped in area, in acre-feet	Number of wells for which irrigated acreage was reported	Total irrigated acreage reported	Average irrigated acreage per well	Estimated irrigated acreage based on total number of wells	Estimated pumpage, in acre-feet per acre
				Brush to Sterling, Colo.—Continued						
1949...	52	3,409	65.56	160	10,490	141	17,460	123.8	19,808	.53
1950...	43	8,604	200.09	161	32,215	141	17,460	123.8	19,932	1.62
				Sterling, Colo., to Colorado-Nebraska State line						
1946...	....	....	162.82	95	15,468	....	....	....	....	....
1947...	....	....	58.79	106	6,232	....	....	....	....	....
1948...	....	....	119.44	108	12,900	....	....	....	....	....
1949...	....	....	65.56	108	7,080	....	....	....	....	....
1950...	....	....	200.09	108	21,610	....	....	....	....	....
				Colorado-Nebraska State line to Paxton, Nebr.						
1946...	....	....	162.82	185	30,121	....	....	....	....	....
1947...	....	....	58.79	211	12,405	....	....	....	....	....
1948...	....	....	119.44	229	27,352	....	....	....	....	....
1949...	....	....	65.56	232	15,210	....	....	....	....	....
1950...	....	....	200.09	232	46,421	....	....	....	....	....

Table 6.—*Estimated total quantity of water, in acre-feet, pumped from irrigation wells in the lower South Platte River valley, 1946–50*

	1946	1947	1948	1949	1950
Pumpage in area between Hardin, Colo., and Colorado-Nebraska State line.	151,441	110,861	167,698	125,964	234,264
Pumpage in area between Colorado-Nebraska State line and Paxton, Nebr.	30,121	12,405	27,352	15,210	46,421
Total pumpage...............................	181,562	123,266	195,050	141,174	280,685

Because field data were insufficient for specific computations for the whole area, the quantity of water pumped in the areas Sterling, Colo., to Colorado-Nebraska State line and Colorado-Nebraska State line to Paxton, Nebr., was estimated by multiplying the number of irrigation wells in these areas by the average quantity of water that was pumped per well in the area from Brush to Sterling.

The estimates given in tables 5 and 6 are only approximate, because several factors affect their accuracy: (1) some well owners overestimate the yield of their wells; (2) the yield of most of the irrigation wells in the area decreases during the pumping season, owing to seasonal drawdown and decline of the water table (discharge measurements made early and late in the pumping season may differ as much as 20 percent); (3) the yields of wells that were measured by Code in 1940 and 1941 may have changed as a result of natural causes, although the discharge of many of the wells remeasured in 1948 was about the same as that indicated by Code (wells in areas of declining water table, such as in the valleys of Beaver and Bijou Creeks, generally showed a decrease in yield, whereas many wells in an area of rising water table, such as the Prospect Valley area, showed an increase in yield); (4) some of the figures on irrigated acreage may be too large, because for some farms the same acreage may have been reported for each of several wells that discharge into a common irrigation system; (5) some farmers may have reported the possible maximum acreage that a well can irrigate rather than the actual acreage that was irrigated; and (6) some farmers may have included an entire subdivision of land though only parts of it actually received water.

PUMPING COSTS

The cost of pumping water from wells depends upon the cost of the fuel or power, the cost of drilling the well and installing the pump, and the cost of maintenance and operation. The only costs determined during the investigation were the power costs.

The cost of electric power required to pump 1 acre-foot of water, the amount of power required to pump 1 acre-foot of water, the amount of power required to lift 1 acre-foot of water a distance of 1 foot, and the over-all efficiency of pumping plants were computed for individual wells from electrical and cost data furnished by the Morgan County Rural Electric Association and from field data collected during this investigation. The results of these computations are shown in table 7.

The initial power payment charged by the Morgan County Rural Electric Association each irrigation season is $7.50 for each billed horsepower and this payment must be used for purchase of power or be forfeited. For example, if a motor is billed for 10 hp, the initial power payment is $75.00. The power rates for each billed horsepower are as follows: 5 cents a kilowatt-hour (kwhr) for the first 100 kwhr, 3 cents a kilowatt-hour for the second 100 kwhr, 2 cents a kilowatt-hour for the third 100 kwhr, 1.25 cents for the next 200 kwhr, and 1 cent a kilowatt-hour for all additional

Table 7.—*Electric power costs, consumption of power, and efficiencies of pumping plants at irrigation wells in selected areas in Colorado, 1949*

[Based on data supplied by Morgan County Rural Electric Association. The number of pumping plants used in determining the average is shown in parentheses]

Area	Average cost per acre-foot	Average kilowatt-hours consumed per acre-foot	Average kilowatt-hours consumed per acre-foot per foot of lift	Average overall efficiency of pumping plant, in percent
Prospect Valley area......	$3.54 (88)	151.6 (88)	2.15 (60)	47.5 (60)
Hardin to Weldona.........	3.34 (8)	99.2 (8)	2.88 (4)	35.7 (4)
Valleys of Bijou and Kiowa Creeks.	3.41 (178)	120.0 (178)	2.48 (97)	41.2 (97)
Fort Morgan area..........	2.97 (46)	106.1 (46)	2.01 (21)	50.7 (21)
Beaver Creek valley......	2.73 (68)	119.5 (68)	2.60 (44)	39.2 (44)
Brush to Sterling...........	4.35 (53)	74.3 (53)	2.43 (32)	42.0 (32)

power used. Thus, the more water pumped in an irrigation season, the lower the unit pumping cost.

The cost of power for pumping an acre-foot of water in 1949 ranged from $2.73 in the Beaver Creek valley to $4.35 in the South Platte River valley between Brush and Sterling. The reason for the relatively high unit pumping cost in the area between Brush and Sterling is that many well owners did not use enough power to take advantage of the lower power rates. The supply of irrigation water diverted from the South Platte River was ample and thus little ground water was needed.

The electric power required to pump an acre-foot of water in 1949 ranged from 74.3 kwhr in the area between Brush and Sterling to 151.6 kwhr in the Prospect Valley area. The average kilowatt-hours consumed per acre-foot of water pumped depends, in general, upon the average distance the water is lifted. The average kilowatt-hours consumed per acre-foot pumped per foot of lift ranged from 2.01 in the Fort Morgan area to 2.88 in the South Platte River valley between Hardin and Weldona, Colo. The overall efficiencies of pumping plants, expressed in percent, ranged from 35.7 for the area between Hardin and Weldona, Colo., to 50.7 in the Fort Morgan area. No explanation is offered for the greater efficiency of the pumping plants in the Fort Morgan area, but many factors are involved, including the age of pumps and motors, the condition of pump impellers, the design, and the general care and upkeep of the plants.

ESTIMATES OF FUTURE PUMPAGE

An estimate of the amount of water pumped by electric power for any year can be made by dividing the total amount of electric power used for pumping by the average amount of power required to pump an acre-foot of water. The average amount of power required to pump an acre-foot of water in the area supplied by the Morgan County Rural Electric Association is about 119 kwhr and a similar amount presumably is required throughout the project area. An estimate of the total ground water pumped can be made by assuming that the average amount of water pumped from each well is the same for both electrically and nonelectrically powered pumps; that is, the amount of water pumped from the electrically powered wells (which constitute 71 percent of all the irrigation wells) can be used as a basis for estimating the total amount of water pumped in the area.

A more convenient and accurate estimate of pumpage in the part of the area between Hardin and Sterling, Colo., including the tributary valleys, can be made from the total power that was sold for irrigation pumping for any particular year by the Morgan County Rural Electric Association. For each acre-foot of water pumped by both electrically and nonelectrically powered pumps, the number of kilowatt hours sold for pumping during the period 1947–50 was as follows: 90.2, 94.5, 97.3, and 92.8, or an average of 93.7 for the 4-year period. Therefore, if the ratio of electrically to nonelectrically powered pumps remains about the same, the approximate total pumpage in acre-feet for any year can be determined by dividing 93.7 into the total annual number of kilowatt-hours sold for irrigation pumping by the Morgan County Rural Electric Association.

GROUND-WATER CONDITIONS

Ground-water conditions within the eight areas into which the South Platte River valley project area has been subdivided (fig. 9) are discussed below. The discussion of each area will have special reference to that part of the area underlain by alluvial deposits, although in many instances the area has been expanded in order to form common boundaries with adjacent areas. For more detailed information regarding ground-water conditions within these areas, the reader is referred to appendixes A, B, C, and D, and the illustrations.

PROSPECT VALLEY AREA, COLORADO

The principal aquifer, or water-bearing formation, is the alluvium underlying the valley of Lost Creek. The width of the aquifer ranges from about 1 to about 5 miles and the thickness from a featheredge to about 200 feet. (See pls. 1 and 4.) Water for domestic, stock, and irrigation use is obtained from wells tapping the alluvium; many wells of large discharge have been constructed in the area. The alluvium is very permeable and transmits water readily to wells. A pumping test at well B2-62-19cd indicated that the coefficient of permeability of the water-bearing material is 2,090 gpd per square foot. The area contains about 123 irrigation wells, most of which have been drilled to the underlying bedrock. The yields of irrigation wells range from about 200 gpm to more than 1,400 gpm and the drawdowns from 6 to 39 feet. The yields of wells near the center of the alluvium-filled channel, where the saturated thickness is greatest, are greater than those of wells near the edges of the channel. Well B1-63-4dd, near the center of the channel, has a specific capacity of 167 gpm per foot of drawdown, whereas B2-63-28bc1, which is reported to be near the edge of the channel, has a specific capacity of only 13 gpm per foot of drawdown. The average specific capacity of 73 wells is 63 gpm per foot of drawdown. The discharge and drawdown of many of the wells are given in appendix C.

In this area, water for irrigation is diverted from the South Platte River and also is pumped from wells. Generally the flow of river water is sufficient for all requirements until late June or early July, but thereafter water is limited to only those irrigators who have high priority. The other irrigators then must rely on ground water, and pumping is heavy until the end of the growing season. In 1950 about 33,000 acre-feet of water was pumped, amounting to about 2.40 acre-feet per irrigated acre. (See table 5.) The amount of ground water stored in the area is estimated to be about 940,000 acre-feet. The depth to water below the land surface in the part of the area underlain by alluvium ranges from less than 1 foot north of Roggen to about 107 feet near the south end of the area. In other parts of the area, the depth to water is greater and, in places, is more than 200 feet. South of the vicinity of Roggen the northeastward gradient of the water table is about 14 feet per mile; north of that vicinity the gradient increases to about 22 feet per mile, or about the slope of the land surface. Recharge to the ground-water reservoir in the area is from precipitation in local and bordering areas and from seepage from canals, reservoirs, and irrigated fields. During the decade 1940-50 a general rise of the water table indicated that recharge exceeded discharge. (See hydrograph B2-63-32aa in fig. 10.) Discharge of ground water is effected largely by pumping from wells and by evaporation and transpiration in the meadowlands north of Roggen. Water from wells tapping the alluvium generally is much harder than water from wells tapping the underlying bedrock. The results of several analyses of ground water from wells in the Prospect Valley area are given in appendix D.

HARDIN TO WELDONA, COLO.

The Hardin to Weldona area includes the area underlain by alluvium in the South Platte River valley from near Hardin to near Weldona, Colo., but does not include the tributary valleys. The principal source of ground water in the area is the alluvium of the South Platte River valley. Because of the lack of test-hole data, the thickness of the alluvium was not determined accurately but is believed to be more than 200 feet in some parts of the area.

Water diverted from the river for irrigation is supplemented by ground water pumped from wells. About 30 irrigation wells, some of which are drilled to bedrock, are in this area. Ground water is abundant and wells of large discharge can be drilled. The specific capacity of such wells generally is high and of some is as much as 100 gpm per foot of drawdown. The water table is within a few feet of the land surface in much of the area, but the depth to water is as much as 40 feet on alluvial terraces. (See depth-to-water data, pl. 3.) No general change in water level during recent years is apparent, although the water level generally rises during each irrigation season. In most of the area the water table slopes almost directly toward the river; the gradient ranges from about 15 to about 70 feet to the mile. (See water-table contour data, pl. 3.) The ground-water reservoir is recharged principally by seepage from canals and reservoirs and partly by precipitation on the sand-hill areas that flank both sides of the valley. Water is discharged from the ground-water reservoir through wells, by evaporation and transpiration in the bottom land, and by seepage into the South Platte River. The ground water in the area is hard. (See results of analyses in appendix D.)

VALLEYS OF BIJOU AND KIOWA CREEKS, COLORADO

The valleys of Bijou and Kiowa Creeks are considered in this report as a single area because wells are the only source of water for irrigation in both valleys, and the water-bearing formations in the two valleys merge and form a common aquifer in the lower reach of the streams.

The principal aquifer is the alluvial fill of the ancestral valleys of Bijou and Kiowa Creeks. This deposit, which consists of beds of sand, gravel, and clay, is 5 to 10 miles wide in Bijou Creek valley and 1 to 3 miles wide in Kiowa Creek valley. Bijou Creek valley is widest at its upper, or south, end, whereas Kiowa Creek valley is widest where it merges with the valley of Bijou Creek, about 8 miles from the South Platte River. The creeks, however, have independent channels to the river. In Kiowa Creek valley the average thickness of the alluvium is about 85 feet, the average depth to water is about 25 feet, and the downvalley slope of the water table is about 18 feet to the mile. In Bijou Creek valley, the alluvium at the southern end of the area is about 100 feet thick and the depth to water about 20 feet whereas north of Wiggins the alluvium is about 240 feet thick and the depth to water about 80 feet. The average downvalley slope of the water table is 15.5 feet to the mile. It is estimated that 2,884,000 acre-feet of ground water is stored in the area. (See table 4.)

During recent years, pumping for irrigation has been heavy in the valleys of Bijou and Kiowa Creeks. About 73,000 acre-feet of water was pumped from 280 wells in 1950. The yields of the wells range from 400 to 1,600 gpm and the drawdowns from 10 to 40 feet. The yield of wells north of Wiggins, where several wells have a specific capacity of more than 90 gpm per foot of drawdown, generally is greater than that from wells south of Wiggins. The larger yields are due in part to the greater saturated thickness of the aquifer north of Wiggins and probably in part to a greater permeability of the alluvium, which seems to contain less clay and more sand and gravel near the river than in the parts of the tributary valleys remote from the river. Except in Kiowa Creek valley above its junction with Bijou Creek valley, water levels have been declining throughout both valleys during the past decade.

Recharge to the ground-water reservoir is effected by the flooding of Bijou and Kiowa Creeks and by precipitation in local and adjacent areas. A small part of the area, in T. 4 N., is recharged partly by seepage from the Empire Reservoir and from the Bijou canal. Ground water is discharged from the area by pumping, by evaporation and transpiration in Bijou Creek bottom lands in Tps. 1 and 2 N., and 1 S., and as underflow toward the South Platte River valley. Ground water obtained from alluvium in the area is hard. (See results of analyses of samples in appendix D.)

FORT MORGAN AREA, COLORADO

Most of the irrigation wells in the Fort Morgan area are pumped to supplement the supply diverted from the South Platte River, although in about 12 square miles of irrigated land in T. 2 N., R. 57 W., all the water used for irrigation is obtained from wells. The principal aquifer in the area is the alluvium underlying the valleys of the South Platte River and Badger Creek. It ranges in thickness from about 50 feet in Badger Creek valley in the vicinity of the Morgan-Adams County line to about 280 feet near the city of Fort Morgan and consists of beds of gravel, sand, and clay. Near the county line the alluvium underlying the valley of Badger Creek is about a mile wide but downstream it is wider and is several miles wide at its junction with the valley of the South Platte River.

Ground-water storage in the area is estimated at 1,029,000 acre-feet (see table 4), most of which is in the alluvium of the South Platte River valley. The water supply for the city of Fort Morgan and the water pumped from about 147 irrigation wells is obtained from this aquifer. Most of the irrigation and public-supply wells in the area are drilled through the alluvium to the underlying Pierre shale. The yields of irrigation wells range from 400 to 1,600 gpm and the drawdowns from 5 to 50 feet. Yields are greatest in those parts of the area not more than 2 or 3 miles from the South Platte River; the specific capacity of several wells near the river is more than 100 gpm per foot of drawdown. Although an exact figure could not be obtained, the pumping test of well B3-58-3ba indicated that the water-bearing materials in the vicinity of the well are highly permeable. Generally pumping is heavy in dry years and moderate in wet years. About 44,000 acre-feet of water, or about 1.74 acre-feet per irrigated acre, was pumped in 1950, whereas about 15,000 acre-feet, or 0.68 acre-feet per irrigated acre, was pumped in 1947. Water levels did not decline significantly in most of the area from 1940 through 1949, but in 1950, which was a year of heavy pumping, water levels dropped sharply. In T. 2 N., R. 57 W., where ground water is used exclusively for irrigation, water levels declined steadily during recent years. The gradient of the water table is northeast toward the river and ranges from 12 to 20 feet to the mile. The ground-water reservoir is recharged chiefly by infiltrating precipitation on local and adjacent areas and by seepage of irrigation water. Ground water is discharged chiefly by pumped wells, by springs and seeps along the South Platte River, and by evaporation and transpiration in the heavily vegetated bottom lands.

BEAVER CREEK VALLEY, COLORADO

The principal source of ground water in the Beaver Creek valley is alluvium, which consists of beds of gravel, sand, and clay. The thickness ranges from a negligible amount at the sides of the valley to about 55 feet in the center of the valley at the south end of the area and to about 120 feet in the valley near the north end of the area. The alluvium ranges in width from 4 to 5 miles throughout most of the valley but near the Morgan-Washington County line it is about 3 miles wide. Ground-water storage in the aquifer is estimated to be 584,000 acre-feet. Most of the irrigation wells in the area were drilled through the alluvium to the underlying Pierre shale. The discharge of the irrigation wells ranges from about 200 to 1,200 gpm; the drawdown ranges from 11 to 26 feet and averages about 17 feet. The specific capacity of most of the wells, therefore, ranges from about 10 to about 65 gpm per foot of drawdown. The permeability of the water-bearing materials is comparatively high; this is indicated by the results of pumping tests of wells B2-56-12da3 and B3-56-26bb. (See table 2.) About 24,000 acre-feet of water, which is about 1.89 acre-feet per irrigated acre, was pumped in 1950 from 138 irrigation wells. The depth to water in the area ranges from about 7 feet to about 45 feet. Water levels in wells in Tps. 1 and 2 N. have been declining steadily for several years, especially in the vicinity of Gary, Colo. The decline of the water table in this particular area is more serious than in any other part of the project area because the zone of saturation in the alluvium is relatively thin (about 30 feet on the average). The gradient of the water table is northward down the valley and ranges from 7 to 15 feet to the mile. The ground-water reservoir is recharged by the flooding of Beaver Creek, by precipitation on this and adjacent areas, and by underflow from adjacent areas. Ground water is discharged by pumped wells, by evaporation and transpiration from meadowlands in T. 3 N., and by ground-water underflow out of the area. Ground water in the area generally is hard; however, the water is relatively soft in those parts of the area mantled by dune sand. The results of analyses of ground water from wells in the area are given in appendix D.

BRUSH TO STERLING, COLO.

The Brush to Sterling area includes the South Platte River valley between Brush and Sterling and also the Pawnee Creek valley. The alluvium in the valleys of the South Platte River and Pawnee Creek is the principal aquifer in the area. The thickness of the alluvium ranges from a negligible amount at the edges of the valleys to about 220 feet in deep channels beneath the South Platte River valley. The alluvium of the Pawnee Creek valley is about a mile wide and 33 feet thick about 5 miles upstream from the junction of the valleys, but it is wider and thicker downstream. The width of the alluvium in the South Platte River valley ranges from about 4 to about 8 miles. The amount of ground water stored in the alluvium in the area is estimated to be 2,063,000 acre-feet. The amount of ground water pumped for irrigation depends on the amount of water needed to supplement the supply available by diversion from the South Platte River. In 1950, a year of heavy pumping, about 32,000 acre-feet of water was pumped from 161 wells, or about 1.62 acre-feet of ground water for each acre irrigated; in 1947, a year of light pumping, only about 9,000 acre-feet was pumped, or about 0.48 acre-feet of ground water for each acre irrigated. The depth to water in the alluvium ranges from less than a foot to about 40 feet. No appreciable change in water levels in the area has occurred in recent years; however, the water-level measurements indicate a seasonal rise and decline of the water table. The slope of the water table and the movement of ground water in the area are diagonally downstream toward the South Platte River. The ground-water reservoir is recharged by seepage of irrigation water, by precipitation on local and adjacent areas, and by inflow of ground water from adjacent areas. Ground water is discharged by pumping, by evaporation and transpiration in waterlogged and vegetated areas bordering the South Platte River, by seepage into the river, and by subsurface flow into the adjacent downvalley area. Dune-sand deposits and the Pierre shale also yield water, generally in small quantities, to wells in the area. Results of analyses of ground water taken from wells in the area are given in appendix D.

STERLING, COLO., TO COLORADO-NEBRASKA STATE LINE

The principal source of ground water in the area between Sterling, Colo., and the Colorado-Nebraska State line is the alluvium of the South Platte River valley. The alluvium ranges in width from about 3 to about 5 miles, and in thickness from a negligible amount at the edges to about 300 feet beneath terraces and dunes on the south side of the valley near Crook, Colo. The amount of ground water stored in the alluvium in the area is estimated to be 2,197,000 acre-feet. The quantity of water pumped from about 106 irrigation wells in 1950, which was a year of heavy pumping, amounted to about 21,000 acre-feet. Yields from wells generally are high; drawdowns range from 6 to 30 feet. Several wells have a specific capacity in excess of 100 gpm per foot of drawdown. Water is pumped from wells to supplement that diverted from the South Platte River, and the amount of pumping depends largely on the amount of available water in the river. The depth to water ranges from less than a foot in some waterlogged areas in the valley bottoms to about 50 feet in alluvial terraces at the edge of the valley. In several waterlogged areas in the vicinity of Iliff, Proctor, Crook, and Sedgwick, Colo., alkali has accumulated on the land surface. No apparent change in depths to water has occurred during recent years, although water levels generally rise during the irrigation season and decline during the nonirrigation season. The water table slopes diagonally downvalley toward the South Platte River and the movement of ground water is in that direction. The ground-water reservoir is recharged by seepage of irrigation water, by precipitation on local and adjacent areas, and by subsurface inflow from the adjacent upstream area and from the Ogallala formation. Ground water is discharged by pumping from wells, by evaporation and transpiration in waterlogged areas and in vegetated areas that border the river, by seepage into the South Platte River, and by subsurface flow into the adjacent downvalley area. Other aquifers yielding water to wells in the area are the Ogallala formation, dune-sand deposits, the Pierre shale, and the Brule formation. Water from these aquifers generally is softer than water from the valley alluvium. Results of analyses of ground water collected from wells in the area are given in appendix D.

COLORADO-NEBRASKA STATE LINE TO PAXTON, NEBR.

The area includes part of both the South Platte River valley and Lodgepole Creek valley and lies entirely within Nebraska. The principal water-bearing formation is the alluvium of the valleys. The alluvium in Lodgepole Creek valley is about a mile wide and ranges in thickness from a featheredge at the sides to about 40 feet in the valley. Part of the underlying Brule formation, however, may consist of reworked fragments of the formation and actually may be part of the alluvium (McLaughlin, 1948, p. 13). The alluvium of the South Platte River valley within the area ranges from about 2 to about 5 miles in width; its edges are not definite because the flanking Ogallala formation also contains beds of sand and gravel that are difficult to distinguish from the alluvium. The alluvium ranges in thickness from a featheredge at the valley sides to about 200 feet near the center of the valley. Ground-water storage in the alluvium in the area is estimated to be 1, 596, 000 acre-feet. The 223 irrigation wells in the area are used mainly to supplement water diverted from the South Platte River. The annual pumpage for irrigation depends, to a large extent, on the amount of available water in the river. The depth to water in the alluvium ranges from less than a foot in waterlogged areas to about 75 feet in terrace deposits that border the valley and exceeds 200 feet in the Ogallala formation which flanks the river valley. The water table slopes diagonally downstream toward the river, except on the north side of the river in the vicinity of Paxton where it slopes diagonally downstream away from the South Platte River and toward the North Platte River. In this part of the area, no appreciable change occurs in the magnitude and direction of slope of the water table as the ground water moves from the alluvium of the South Platte River valley through the Ogallala formation into the alluvium of the North Platte River valley. No general rise or decline of water levels has taken place in recent years. The water table generally rises during the

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irrigation season in that part of the area where water is diverted from the South Platte River but declines during the irrigation season in that part of the area where water for irrigation is pumped entirely from wells. The ground-water reservoir is recharged by seepage from canals and irrigated land, by precipitation on local and adjacent areas, and by inflow of ground water from the Ogallala formation and from the alluvium in the upstream area. Ground water is discharged by pumping, by evaporation and transpiration in waterlogged and vegetated areas along the river, and by outflow of ground water into the adjacent downstream area.

Other aquifers that supply water to wells in the area are the Ogallala and Brule formations and the dune-sand deposits. The Ogallala formation is the most important of these and is the principal source of ground water in areas that flank the valleys of the South Platte River and Lodgepole Creek. Some of the wells near the valley edges derive water from both the alluvium and the Ogallala formation. Water from the Ogallala formation generally is softer than water from the alluvium, except in areas where outflow from the Ogallala formation is the principal source of recharge to the alluvium. Results of analyses of ground-water samples collected in the area are given in appendix D.

CHEMICAL QUALITY OF THE GROUND WATER

By Herbert A. Swenson

The general study of the ground-water resources in the lower South Platte River valley included a comprehensive investigation of the chemical quality of the water. Facts obtained in this investigation were used to define the character of the water in bedrock aquifers and in unconsolidated deposits and to provide a basis for rating the suitability of the water for irrigation and domestic use. Furthermore, the occurrence and areal distribution of the different classes of water were established from knowledge of their chemical quality.

Between 1947 and 1950, samples of ground water were collected and analyzed, and 123 of these analyses are tabulated in appendix D. Nearly three-fourths of the samples represent water from the alluvium. The classification of the 123 water samples as to origin is summarized below.

Origin of sample	*Number*
Bedrock formations	17
Surficial deposits (alluvium, dune sand)	97
Mixed sources	9
Total	123

The mineral analyses of these samples included the determination of silica, iron, calcium, magnesium, sodium, potassium, bicarbonate, sulfate, chloride, fluoride, nitrate, boron, and dissolved solids. Total hardness, noncarbonate hardness, and percent sodium were computed. The physical properties pH and specific conductance were measured and reported.

The samples were analyzed according to methods regularly used by the Geological Survey. These methods are essentially the same or are modifications of methods described in recognized authoritative publications for the mineral analysis of water samples (Collins, 1928; Am. Public Health Assoc., 1946).

Earlier reports on the chemical character of ground water in the South Platte River valley were based on a relatively small number of samples. Slichter and Wolff (1906, p. 12–15) reported chemical analyses for several samples of water from wells in the valley between Sterling, Colo., and North Platte, Nebr. Wenzel and Waite (1941, p. 45–48) briefly discussed the quality of the ground water in that part of the valley lying in Keith County, Nebr. Code (1943, p. 5–6) showed approximate ranges in the mineral content of water from wells in an area that extended from west of Fort Collins to the vicinity of Julesburg, Colo. These ranges were established on the basis of the analyses of a few selected samples of water from widely distributed wells and also of samples that had been submitted by farmers in the region. Later, Code (1945, p. 10) listed the analyses of water from three wells in a discussion of the ground-water supply of Prospect Valley, Colo.

SOURCES OF DISSOLVED MINERAL SUBSTANCES

COMPOSITION OF THE DISSOLVED SOLIDS

Ground water is an aqueous solution of certain mineral solids. These solids consist chiefly of the bicarbonates, sulfates, and chlorides of the alkaline earths and the alkali metals. Most natural water contains calcium, magnesium, sodium, bicarbonate, sulfate, and chloride in appreciable amounts. Both the amount and the composition of the dissolved mineral substance are influenced considerably by the nature of the rocks or soils through which the water has passed and by the length of time the water has been in contact with these rocks or soils. Underground water usually is more highly concentrated than direct surface runoff as it remains in contact with the rocks and soils for much longer periods.

The mineral substance dissolved in a water is not a composite of unrelated amounts of the different constituents. The quantities of the bases—calcium, magnesium, sodium, and potassium—are together chemically equivalent to the sum of the acids—bicarbonate, sulfate, chloride, and nitrate. These constituents are in chemical equilibrium with each other; however, certain other constituents, such as aluminum, silica, and possibly iron, usually occur in minor amounts and generally are considered to be present in the colloidal state as oxides.

SOLUBLE SUBSTANCES IN WATER FROM BEDROCK SOURCES

An examination of several samples of ground water from the Pierre shale revealed that the water is soft, that the principal constituents are sodium and bicarbonate, that chloride is present in appreciable concentrations, and that sulfate is found only in small amounts. These conclusions are summarized in the table below.

Analyses of water from the Pierre shale

[In parts per million]

Well no.	Well depth (feet)	Total hardness as $CaCO_3$	Sodium (Na)	Bicarbonate (HCO_3)	Chloride (Cl)	Sulfate (SO_4)	Dissolved solids
B9-51-16ab2	220	27	590	785	478	22	1,500
B7-53-27ca	230	36	432	810	235	2.4	1,110
B9-51-29ab	310	57	669	710	658	15	1,740
B5-54-2bc	330	38	484	710	167	256	1,290
B10-50-24cd1	385	26	428	564	362	.0	1,090
B8-52-21ac2	435	26	676	798	598	5.0	1,700
B7-52-5bb	435	128	239	444	127	103	778
B2-63-31aa	650	19	290	673	60	6.0	708

The relatively small amounts of calcium and magnesium in the water, as indicated by the low hardness, suggest that cation-exchange reactions have taken place whereby the calcium and magnesium originally present in the water have been replaced by alkalies in the bedrock material. This reasoning seems plausible when it is recalled that bentonite, a micaceous clay mineral capable of readily exchanging its bases, is present in the Pierre shale. This mineral, containing several percent of alkalies, is a highly absorbent variety of clay and is used commercially in the purification and softening of water. The phenomenon of ion exchange in water from the Pierre shale is noted in samples from eight deep wells that range in depth from 220 to 650 feet. The analysis of a sample from a shallow well 43.5 feet deep (B4-57-19db, in Morgan County), shows a hardness of 999 ppm (parts per million) although this well is drilled into the Pierre shale. However, water in this well is recharged by hard gypsiferous water from a nearby irrigation canal; also, the high hardness of water in this shallow well may be indirectly caused by the absence of bentonitic layers in the upper strata of the Pierre shale.

The shales and sandstones composing the Fox Hills sandstone yield soluble materials to ground water that reaches these strata. One water sample is reported from this formation and was collected from well B2-62-6ca (Weld County), more than 100 feet deep. This water is soft, and its sodium bicarbonate character resembles that of the water from the Pierre shale, although the sample from the Fox Hills sandstone is lower in mineral content.

The soluble mineral substances in water from the Laramie formation are tentatively identified on the basis of one sample of water from this aquifer. Well B1-62-5aa (Weld County), 190 feet deep, produces a brackish water of high mineral content, a considerable amount of which is sodium chloride. The fact that the lower part of the Laramie formation is of marine origin may explain the saline character of this water. It has been suggested that water rising along a deep-seated fault may be the source of the sodium chloride.

The Ogallala formation, which contains much calcium carbonate cementing material, yields a calcium bicarbonate water, as shown by analyses of 6 samples from wells that range in depth from 60 to 225 feet. This water dissolves moderate quantities of minerals; the range in concentration of dissolved solids for 6 samples was from 152 to 396 ppm.

SOLUBLE SUBSTANCES IN WATER FROM SURFICIAL DEPOSITS

The unconsolidated gravels, sands, silts, and clays in the alluvial fill yield water in which calcium and sulfate compose much of the dissolved solids. The gypsiferous character of the water appears to be due to the pressure in the aquifer of material derived from gypsiferous shales. Gypsum ($CaSO_4 \cdot 2H_2O$) is present in small amounts in the Pierre shale, which underlies the entire area. Elias (1931, p. 47–48) in his study of the geology of Wallace County, Kans., pointed out that the Pierre shale of eastern Colorado does not differ much in composition from that in western Kansas. He stated—

> Pyrite or marcasite, chiefly in the form of minute casts of Foraminifera or in the form of a crust associated with other organic remains, is fairly uniformly scattered through the whole formation and can be found in every piece of fresh shale. These minerals, however, rapidly decompose near the surface and are replaced by iron hydroxide and by flakes or larger crystals of gypsum.

The iron content of the Pierre shale of eastern Colorado has been determined by Butler (1914, p. 342) who reported 4.41 and 9.48 percent ferric oxide (Fe_2O_3) for two samples.

The dune sands in the lower South Platte River valley, because of their quartzitic character, contribute only moderate amounts of soluble minerals to water that passes through these deposits. Brown (1950, p. 13) reports that the sand-dune area south of the South Platte River valley and west of Beaver Creek valley contains relatively soft water (average hardness, 80 ppm) that has no objectionable concentrations of mineral constituents.

GEOLOGY AND ITS RELATION TO CHEMICAL QUALITY

It has been shown that the lithological or mineralogical character of the water-bearing material determines to a large extent the chemical quality of the ground water. In figure 14 the results of the analyses of different types of water are shown graphically; only the principal mineral constituents are plotted. The following paragraphs describe the chemical quality of the water in the several aquifers. Chemical analyses of water samples are given in appendix D.

Pierre shale.—Of 8 water samples from the Pierre shale, 6 have concentrations of dissolved solids in excess of 1,000 ppm. The low hardness, which characterizes water from this formation, may be the result of a cation-exchange reaction. The water is of the sodium bicarbonate type and may contain several hundred parts per million of chloride. Several of the samples were obtained from wells in Logan County where the Pierre shale crops out along the flanks of the river valley.

Fox Hills sandstone.—The single sample representing water from the Fox Hills sandstone was obtained from well B2-62-6ca in Weld County. This water, although less mineralized, is very similar in chemical character to water from the Pierre shale. The contact of the Fox Hills sandstone with the underlying Pierre shale, where it is exposed in Morgan and Weld Counties, is gradational; the sample from well B2-62-6ca probably represents water from the transition zone.

Laramie formation.—The water from the Laramie formation from well B1-62-5aa in Weld County is salty. Almost one-half by weight of the dissolved solids (2,150 ppm) in the water was chloride. The owner of the well stated that the water is unfit for drinking.

Ogallala formation.—Moderate concentrations of dissolved solids, most of which is calcium bicarbonate, characterize water from

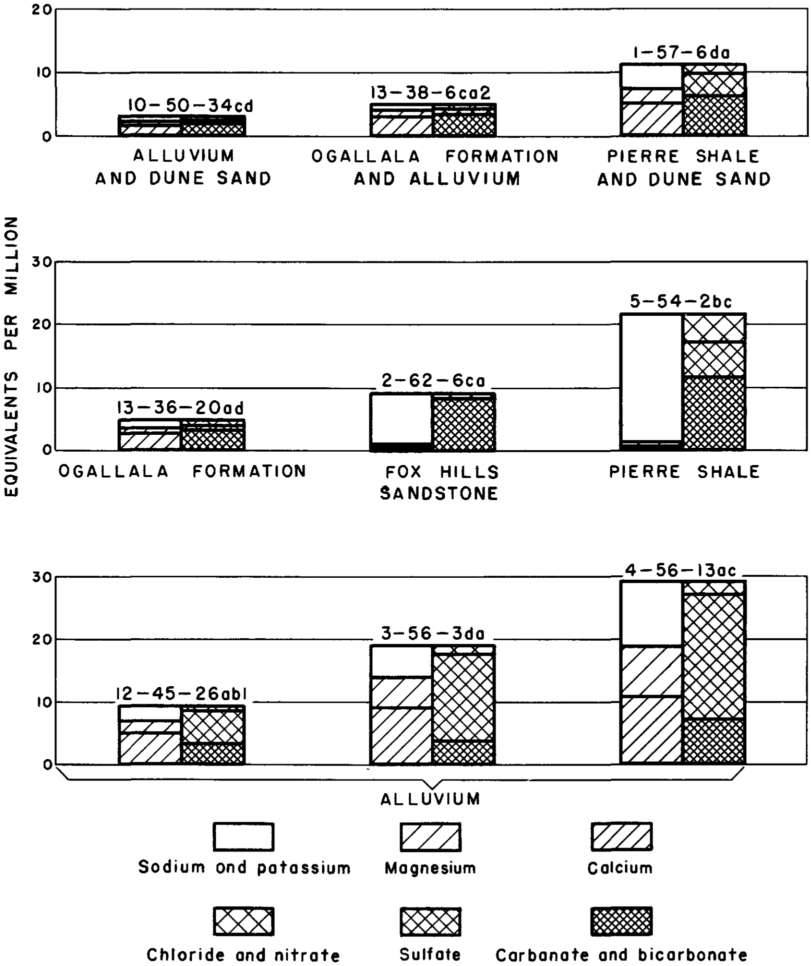


Figure 14. —Analyses of ground water from aquifers in the lower South Platte River valley.

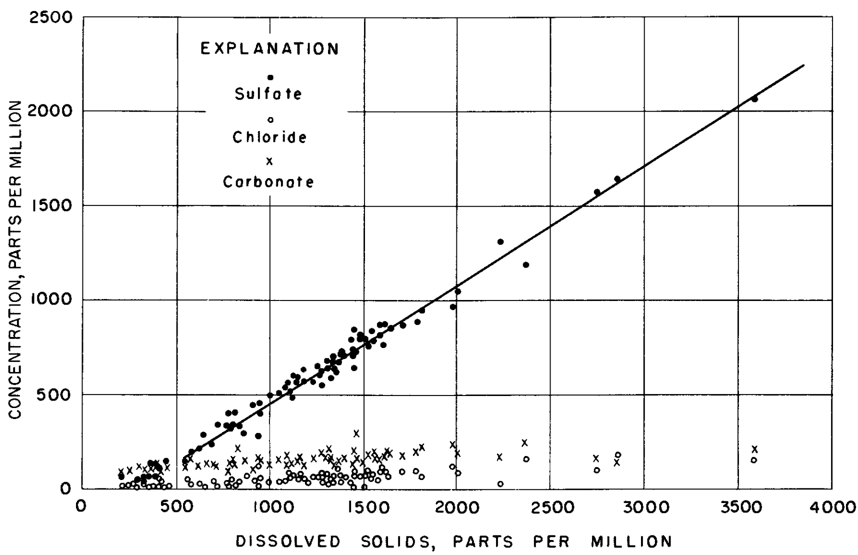
the Ogallala formation. The table below summarizes the chemical quality of water from this aquifer.

Analyses of water from Ogallala formation

[In parts per million]

Well no.	Depth (feet)	Dissolved solids	Total hardness
B11-45-18aa	....	396	193
B11-46-30bb	60	344	181
B12-40-17aa	140	152	106
B13-36-20ad	....	314	179
B13-38-31ab	225	228	139
B14-37-34ac	183	296	170

Surficial deposits.—The chemical quality of water in the alluvium is established on the basis of analyses of 89 water samples from this source. The concentration of dissolved solids ranges from 212 to 3,580 ppm and averages 1,170. The average composition of the bases (calcium, magnesium, sodium, and potassium) is roughly 70 percent alkaline earths (calcium and magnesium) and 30 percent alkalies (sodium and potassium), calculated as equivalents per million. Of the acids, sulfate is the predominant constituent in the water. This statement is best illustrated by figure 15 where concentrations of three acidic ions in the water are



RANGE IN CONCENTRATION
(ports per million)

Sulfote (SO_4)-------------18 to 2,070
Corbonote (CO_3)--------------59 to 262
Chloride (Cl)---------------5.0 to 174
Dissolved solids---------212 to 3,580

Figure 15. —Relation of sulfate, carbonate, and chloride to dissolved solids in ground water from the alluvium.

plotted against dissolved solids; all concentrations are expressed in parts per million. Figure 15 shows that the concentration of sulfate increases in almost direct proportion to that of the dissolved solids, whereas carbonate (computed from bicarbonate) and chloride do not show this relationship to the total mineral content.

Ground water from the alluvial deposits is hard. The hardness of the water is little affected by depth or location of well. More than 90 percent of the samples had hardness in excess of 200 ppm, and 50 percent had in excess of 600 ppm. A hardness-distribution curve for ground water in the alluvium is shown in figure 16.

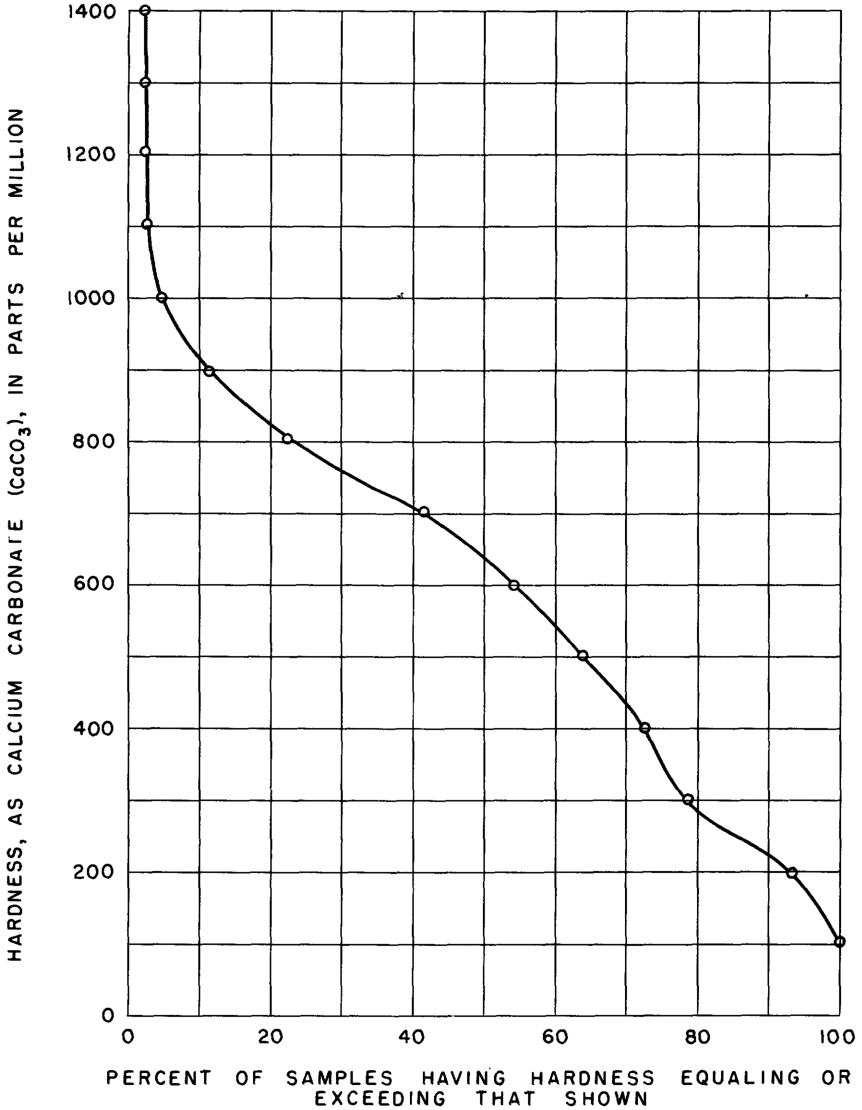


Figure 16.—Hardness-distribution curve for ground water in the alluvium.

The chemical quality of water in the alluvium that is overlain by dune sand is represented by analyses of seven samples. The water in five of the samples was of the calcium bicarbonate type and contained moderate concentrations of dissolved solids. Water from wells B1-56-5dc and B8-52-34ac, however, was more highly mineralized and was of the calcium sulfate type.

One analysis of a water sample from well B7-52-9dc represents water from the dune sand only.

GEOGRAPHY AND ITS RELATION TO CHEMICAL QUALITY

The alluvium is the most important aquifer in the lower South Platte River valley. Because of the widespread occurrence of this water-bearing material, the quality of its water is discussed in relation to the geography of the area.

Main valley.—Ground water in the heavily irrigated areas in the main valley is progressively more mineralized downstream because return flows to the South Platte River of underground drainage water from irrigated lands are used and reused downstream. These return flows are highly mineralized as the result of the relatively slow movement of the water through the interstices of the unconsolidated alluvial materials and of evaporation of ground water near the surface. The river water is used and reused in subsequent diversions to irrigation canals and ditches. Records of the quality of the water from the South Platte River and Bijou Creek are published in annual reports of the U. S. Geological Survey (1950, 1952, 1953, 1954, 1955). The downvalley trend in increased mineral content of ground water for seven wells and one spring in Morgan County is shown below.

Well or spring (downstream order)	Dissolved solids (parts per million)	Well or spring (downstream order)	Dissolved solids (parts per million)
B4-60-6cc	1,090	B4-56-33bb	1,630
B4-60-2aa	1,450	B4-56-26cc	1,510
B4-59-13aa	1,150	B4-56-13ac	1,810
B4-57-31bb	1,550	B4-55-6cb2	1,780

Tributary valleys.—The ground water in valleys tributary to the South Platte River is similar in chemical quality to that in the main valley except where recharge to the water table is largely from flood flows. Wells along the lower reaches of Bijou, Kiowa, and Beaver Creeks produce water of moderate hardness and concentrations of dissolved solids. The ground water in these lower reaches is of better quality than water in the upper reaches or in the main valley.

WATER UTILIZATION AND ITS RELATION TO CHEMICAL QUALITY

Irrigation supplies.—Wilcox (1948, p. 25–27) has classified the quality of water for irrigation use on the basis of specific conductance (a measure of the dissolved solids), percent sodium, and the concentration of boron. As boron is rarely found in critical concentrations in irrigation water in the lower South Platte River valley, it will not be further considered in this section. The classification of irrigation supplies on the basis of specific conductance and percent sodium is easily seen by a diagram in which the percent sodium is shown in an inverse curvilinear relationship to the specific conductance. (See fig. 17.) All water samples from bedrock and

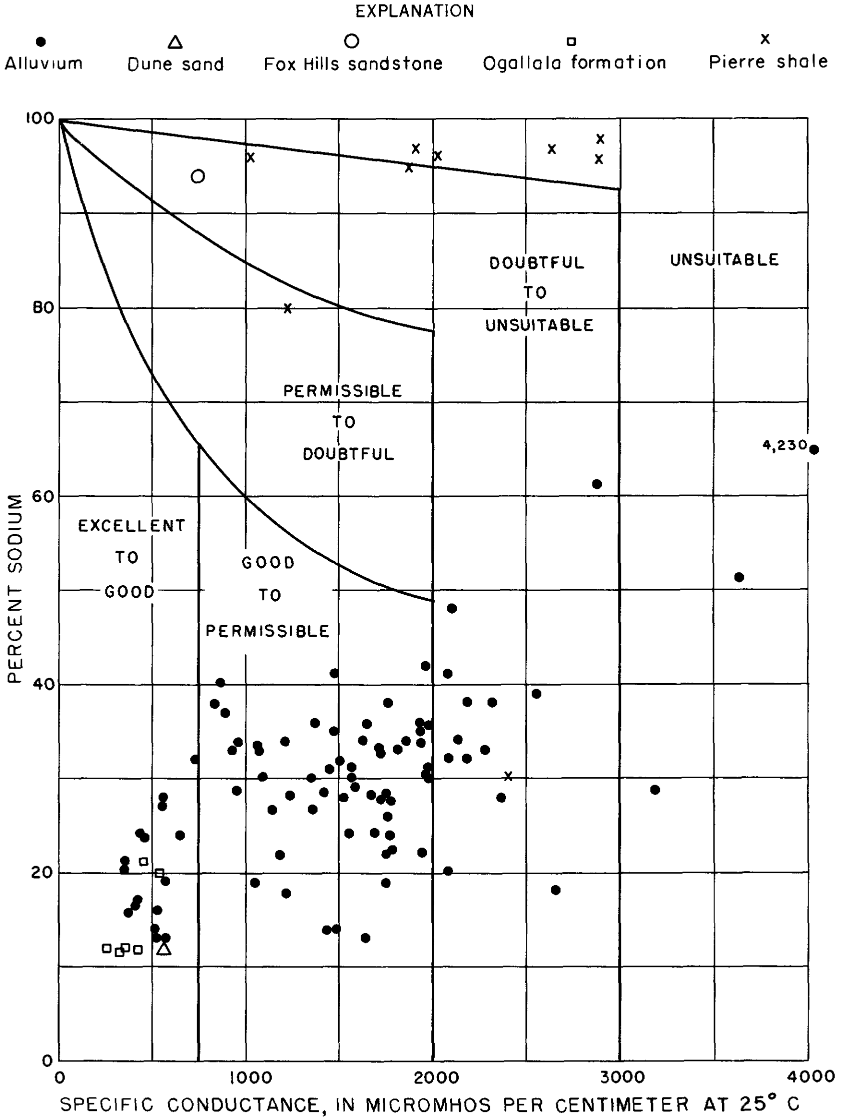


Figure 17.—Classification of normal-type ground water for irrigation use.

surficial deposits have been classified; a few samples of mixed origin were not classified.

Water from the Ogallala formation and from the dune sand has an "excellent to good" rating. (See fig. 17.) Most of the wells in the alluvial deposits produce water of "good to permissible" classification. Water from the Pierre shale and Fox Hills sandstone is of poor quality for irrigation.

Irrigation wells in the valley derive water from the alluvial deposits and this water is, as a general rule, of satisfactory quality.

Domestic supplies.—The source of most domestic supplies in the area is the alluvium, which yields hard water of moderate to high mineral content. If available, water from the Ogallala formation or from the alluvium overlain by dune sand is preferred because of lower concentrations of dissolved solids and lower hardness. The water from the alluvium is usually palatable and, except for hardness, is satisfactory for general use.

Public supplies.—The drinking-water standards of the U. S. Public Health Service (1946, p. 12–14) place definite limitations on water supplies and water-supply systems that are used by interstate carriers subject to Federal regulations. These standards are of general interest because they define an acceptable water and can be used as a basis for comparing water supplies. The standards pertaining to chemical characteristics appear in abridged form below.

Constituent	*Not to exceed (parts per million)*
Iron and manganese together	0.3
Magnesium	125
Chloride	250
Sulfate	250
Fluoride	1.5
Dissolved solids	500 (1,000 permitted)

The concentrations of these constituents in ground-water supplies of towns in the lower South Platte River valley are shown below.

Analyses of public water supplies

[In parts per million]

Town	Well no.	Iron	Magnesium	Sulfate	Chloride	Fluoride	Dissolved solids
Colorado:							
Fort Morgan	B3-57-6bd	0.10	51	586	46	0.5	1,120
Brush	B3-56-26bb	[a].06	....	....	....	.5	152
Merino	B6-54-13da	.25	55	646	50	.7	1,260
Sterling	B8-52-34ac	.10	24	446	31	.3	934
Iliff	B9-51-16ab1	.02	90	2,070	153	1.0	3,580

Analyses of public water supplies— Continued

Town	Well no.	Iron	Magnesium	Sulfate	Chloride	Fluoride	Dissolved solids
Colorado—Continued							
Crook	B10-49-11cb	0.09	41	712	87	0.6	1,440
Sedgwick	B11-46-20cb	.13	9.5	30	13	.4	298
Ovid	B12-45-29ad	.55	12	70	11	.8	354
Julesburg	B12-45-26ab1	[a].14	16	248	27	.4	696
Nebraska:							
Big Springs	B13-42-25dd1	.62	7.3	29	10	.6	248
Ogallala	B13-38-6ca2	.16	12	60	11	.5	340
Paxton	B13-35-5ca	.04	33	452	43	.3	916

[a]Iron and manganese.

LOGS OF TEST HOLES, WELLS, AND SEISMOGRAPH SHOT HOLES

Listed in appendix B are 648 logs of wells, test holes, and seismograph shot holes drilled in the lower South Platte River valley between Hardin, Colo., and Paxton, Nebr. Included are the logs of 187 test holes drilled under the supervision of the U. S. Geological Survey and 39 test holes drilled in cooperation with the Conservation and Survey Division of the University of Nebraska. The locations of test holes and wells used in constructing the cross sections and pre-Quaternary topography are shown on plate 1.

Logs entitled "samples log" are those for which the well cuttings were collected and studied by geologists of the U. S. Geological Survey. The "drillers' logs" are logs obtained from drillers' records or from other sources. Geologic interpretations of "drillers' logs" were made by geologists of the U. S. Geological Survey. Some of these logs are of test holes drilled for favorable locations for irrigation wells. Some of the domestic and stock wells for which logs are given are not included in the table of well records. The logs are arranged in numerical order according to counties, first in Colorado and then in Nebraska.

RECORDS OF WELLS AND SPRINGS

Records of 1,767 wells and springs in the area were obtained. The locations of these are shown on plate 3. The available pertinent data for all the wells and springs shown on the map are given in appendix C. It was not possible to obtain measurements of the well depth or of the water level in some of the wells and the data given in the table for these wells were reported by the owner or driller of the well. The wells are grouped first according to the State and then to county within the State, and are arranged in numerical order within each county.

CONCLUSIONS

Ground water in sufficient quantities for irrigation and other supplies is contained in the alluvial deposits that underlie the valleys of the South Platte River and its tributaries. An estimated 12,700,000 acre-feet of water is stored in the alluvium within the project area. Wells that would yield 500 to 1,000 gpm could be developed in the alluvium in most places and wells that would yield as much as 2,000 gpm probably could be developed in the thick saturated sections of the alluvium in the valley of the South Platte River.

The alluvium is recharged chiefly by infiltration from irrigation systems and by precipitation on local and adjacent areas. Water is discharged from the alluvium chiefly by seepage into the South Platte River, by evaporation and transpiration, and by pumping.

Recharge to the ground-water reservoir from infiltrating irrigation water has raised the water table and caused seeps in some low-lying areas bordering the South Platte River. These seeps could be drained by lowering the water table a few feet, either by decreasing the recharge or increasing the discharge of ground water in the area. The amount of recharge could be decreased by lining the canals or by decreasing the amount of water that is applied to the land; the discharge of ground water could be increased by installing drains and by pumping additional water from the gound-water reservoir. If the pumped water were used for irrigation, the amount of surface water that is needed for this purpose would by reduced. Consequently, a balanced surface- and ground-water irrigation system could be established. In parts of the area where the ground-water reservoir is replenished by recharge from the South Platte River and from adjacent areas during the nonirrigation season, large quantities of water could be pumped from the ground-water reservoir into canals and reservoirs during the irrigation season.

Discharge of ground water by pumping in areas that depend entirely on ground water for irrigation has lowered the water levels in the valleys of Bijou and Kiowa Creeks and in parts of the Fort Morgan area and Beaver Creek valley. This condition is most serious in the vicinity of Gary, Colo., where the alluvium is relatively thin.

Surficial deposits in the valley yield water of acceptable quality for most purposes. The alluvial deposits yield hard water of moderate to high concentrations of dissolved solids, much of which is calcium sulfate. This water is of satisfactory quality, as a rule, for irrigation and domestic uses. Ground water from the alluvium overlain by dune sand and from the Ogallala formation is softer and is preferred, when available in sufficient quantities, to water from the alluvium. The bedrock deposits, except the Ogallala formation, generally yield water of poor quality for irrigation or other uses.

It is anticipated that there will be future hydrologic problems in the project area because the number of irrigation wells draining water from a limited aquifer is steadily increasing, the water table in parts of the area is declining at an accelerating rate, and the mineralization of ground water in irrigated areas is increasing. Therefore, hydrologic studies should be continued in the lower South Platte River valley. The periodic measurement of water levels in observation wells should be continued, the annual pumpage of ground water for irrigation should be estimated, and the chemical quality of water in selected wells should be determined at intervals. Additional pumping tests should be made to obtain more information regarding the hydrologic properties of the water-bearing materials.

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APPENDIX A

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Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska

[In feet below land-surface datum]

ADAMS COUNTY, COLO.

C1-60-4cc

Date	Water level	Date	Water level	Date	Water level
Nov. 29, 1940	18.0	Aug. 26, 1947	27.10	Mar. 15, 1949	24.17
May 5, 1941	18.1	Oct. 8	23.80	Apr. 14	24.28
Nov. 4	19.7	Nov. 4	23.47	May 4	23.84
Apr. 18, 1942	18.6	Dec. 3	23.14	June 17	23.59
Nov. 19	19.2	Jan. 8, 1948	23.02	Aug. 3	27.44
Apr. 1, 1943	18.8	Feb. 3	22.84	Oct. 17	25.37
Nov. 18	20.2	Mar. 3	22.70	Dec. 12	24.76
May 1, 1944	20.25	Apr. 13	22.40	Feb. 3, 1950	24.31
Oct. 26	22.09	Oct. 4	26.83	Apr. 10	24.01
May 3, 1945	20.27	Nov. 4	26.34	May 22	23.72
Oct. 31	22.08	Dec. 6	24.96	Oct. 17	26.30
Apr. 24, 1946	22.38	Jan. 14, 1949	24.62	Dec. 14	25.77
Oct. 30	23.16	Feb. 7	24.35		

C1-60-17dc

Date	Water level	Date	Water level	Date	Water level
Nov. 19, 1942	25.09	Dec. 3, 1947	28.81	Feb. 7, 1949	29.05
Apr. 1, 1943	25.15	Jan. 8, 1948	28.47	Mar. 15	28.88
Nov. 18	25.74	Feb. 3	28.09	Apr. 14	28.86
May 1, 1944	25.61	Mar. 3	28.35	May 4	28.65
Oct. 26	28.35	Apr. 13	28.00	June 17	28.40
May 3, 1945	26.40	June 30	30.82	Oct. 17	33.13
Oct. 31	27.32	Sept. 1	35.33	Dec. 12	30.50
Apr. 24, 1946	26.70	Nov. 4	30.85	Feb. 3, 1950	29.72
Oct. 30	29.10	Dec. 6	29.77	Apr. 10	29.39
Oct. 8, 1947	30.85	Jan. 14, 1949	29.09	Dec. 14	31.70
Nov. 4	29.77				

C1-60-29cb1

Date	Water level	Date	Water level	Date	Water level
Jan. 23, 1934	29.50	Oct. 8, 1947	33.55	Feb. 7, 1949	30.78
May 5, 1941	30.75	Nov. 4	32.55	Mar. 15	31.05
Nov. 4	31.96	Dec. 3	31.14	Apr. 14	31.00
Apr. 18, 1942	30.81	Jan. 8, 1948	30.68	May 4	31.52
Nov. 19	30.78	Feb. 3	30.36	June 17	32.90
Apr. 1, 1943	29.80	Mar. 3	30.34	Oct. 17	34.09
Nov. 18	29.42	Apr. 13	30.20	Dec. 12	33.08
May 1, 1944	29.90	June 30	32.06	Feb. 3, 1950	31.45
Oct. 26	32.00	Oct. 4	34.88	Apr. 10	31.74
May 3, 1945	30.15	Nov. 4	33.28	Oct. 17	34.43
Oct. 31	32.65	Dec. 6	32.90	Dec. 14	32.70
Oct. 30, 1946	33.29	Jan. 14, 1949	32.17		

C2-60-19bc

Date	Water level	Date	Water level	Date	Water level
Sept. 4, 1930	14.50	Apr. 24, 1946	17.48	Jan. 14, 1949	18.85
Nov. 30, 1940	18.00	Oct. 30	17.55	Feb. 7	18.93
May 5, 1941	18.00	Aug. 26, 1947	17.73	May 4	17.55
Nov. 8	18.02	Oct. 8	17.58	June 17	17.58
Apr. 18, 1942	17.88	Nov. 4	17.57	Aug. 3	17.35
Nov. 19	17.64	Apr. 13, 1948	17.40	Oct. 17	18.02
Apr. 1, 1943	17.56	June 4	17.42	Dec. 12	17.55
Nov. 18	17.61	Aug. 4	17.59	Apr. 10, 1950	17.40
May 1, 1944	17.54	Sept. 1	17.56	May 22	18.02
Oct. 26	17.60	Oct. 4	17.58	Aug. 2	16.68
May 3, 1945	17.56	Nov. 4	17.68	Oct. 17	17.07
Oct. 31	17.55	Dec. 6	17.54		

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.

B6-53-16dd

Date	Water level	Date	Water level	Date	Water level
Aug. 22, 1947	22.80	July 12, 1948	22.25	July 8, 1949	22.97
Sept. 12	22.10	Aug. 6	21.79	Aug. 10	22.18
Oct. 6	22.10	Sept. 10	21.15	Oct. 19	21.84
Nov. 4	22.52	Oct. 7	20.82	Dec. 1	22.85
Dec. 10	22.58	Nov. 1	21.63	Feb. 7, 1950	23.05
Jan. 2, 1948	23.32	Dec. 6	22.36	Apr. 12	23.74
Feb. 6	23.64	Mar. 3, 1949	23.40	May 26	22.54
Mar. 8	23.74	Apr. 8	23.68	Aug. 4	21.67
Apr. 16	23.70	May 4	23.77	Oct. 20	22.22
June 7	22.71	May 31	24.50	Dec. 7	23.37

B6-53-30bc

Date	Water level	Date	Water level	Date	Water level
Aug. 21, 1947	12.20	Sept. 10, 1948	11.97	July 8, 1949	11.47
Oct. 6	12.48	Oct. 7	12.00	Aug. 10	11.76
Nov. 4	12.74	Nov. 1	12.77	Oct. 19	12.48
Dec. 10	13.08	Dec. 6	13.27	Dec. 1	13.26
Jan. 2, 1948	13.07	Jan. 20, 1949	12.94	Feb. 7, 1950	13.58
Feb. 6	12.69	Feb. 8	13.09	Apr. 12	13.36
Mar. 8	12.57	Mar. 3	13.35	May 26	12.55
Apr. 16	12.83	Apr. 8	13.33	Aug. 4	12.19
June 7	11.51	May 4	12.38	Oct. 20	12.73
Aug. 6	13.27	May 31	12.57	Dec. 7	13.55

B6-54-24bc

Date	Water level	Date	Water level	Date	Water level
Aug. 19, 1947	9.70	Aug. 2, 1948	11.20	Aug. 10, 1949	10.44
Oct. 6	11.47	Sept. 10	11.55	Oct. 19	11.49
Nov. 4	12.45	Oct. 7	11.20	Dec. 1	12.89
Dec. 10	11.52	Nov. 1	11.90	Feb. 7, 1950	13.63
Jan. 2, 1948	13.35	Dec. 6	12.98	Apr. 13	13.13
Feb. 6	13.40	Apr. 8, 1949	14.00	May 26	11.39
Mar. 8	12.83	May 4	12.10	Aug. 4	11.05
Apr. 16	12.40	June 6	11.16	Oct. 18	12.57
June 7	11.09	July 8	10.33	Dec. 7	13.44
July 12	10.55				

B6-54-32ba

Date	Water level	Date	Water level	Date	Water level
Sept. 4, 1947	61.50	Oct. 6, 1947	61.62	Nov. 4, 1947	61.90

B7-52-7ac

Date	Water level	Date	Water level	Date	Water level
May 3, 1944	14.93	May 1, 1947	15.29	Sept. 10, 1948	10.48
Oct. 24	12.75	Sept. 8	11.65	Oct. 8	10.38
May 1, 1945	15.33	Oct. 6	11.32	Nov. 1	10.80
Nov. 1	13.60	June 7, 1948	11.20	May 31, 1949	11.25
Apr. 25, 1946	14.58	July 12	11.13	July 8	12.00
Oct. 29	13.86	Aug. 6	10.60		

B7-53-18bd

Date	Water level	Date	Water level	Date	Water level
Dec. 11, 1947	16.53	Mar. 2, 1949	17.77	Dec. 1, 1949	17.58
May 5, 1948	16.75	Apr. 7	17.28	Feb. 7, 1950	16.80
Sept. 10	21.52	May 4	17.10	Apr. 12	17.27
Nov. 1	18.32	May 31	17.08	May 26	18.87
Dec. 6	18.04	July 8	16.79	Oct. 18	19.97
Feb. 8, 1949	17.90	Oct. 13	17.71	Dec. 2	18.88

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.—Continued

B7-53-21bc

Date	Water level	Date	Water level	Date	Water level
Apr. 2, 1943	14.98	Nov. 4, 1947	13.50	May 4, 1949	13.82
Nov. 19	13.59	Dec. 11	14.58	May 31	13.52
May 3, 1944	14.33	Dec. 30	14.69	July 8	11.88
Oct. 24	13.69	Feb. 6, 1948	14.88	Oct. 13	13.31
May 1, 1945	14.53	Apr. 16	15.20	Dec. 1	13.17
Nov. 1	13.82	July 12	15.09	Feb. 7, 1950	13.84
Apr. 25, 1946	14.88	Sept. 10	16.05	Apr. 12	14.17
Oct. 29	13.92	Oct. 8	14.48	May 26	13.95
May 1, 1947	14.86	Nov. 1	13.86	Oct. 18	14.32
Aug. 28	17.15	Mar. 2, 1949	13.32	Dec. 2	13.52
Oct. 6	14.72	Apr. 7	13.78		

B7-53-23bb

Date	Water level	Date	Water level	Date	Water level
Nov. 2, 1940	31.7	Oct. 6, 1947	27.61	Feb. 8, 1949	27.67
May 6, 1941	33.6	Nov. 4	28.10	Mar. 2	28.29
Nov. 5	31.34	Dec. 11	29.15	Apr. 7	28.70
Apr. 17, 1942	32.45	Dec. 30	29.36	May 4	29.11
Nov. 20	29.22	Feb. 6, 1948	30.00	May 31	28.26
Apr. 2, 1943	33.47	Mar. 12	30.55	July 8	27.39
Nov. 19	26.45	Apr. 16	30.98	Aug. 10	25.40
May 3, 1944	30.95	June 7	29.02	Oct. 14	24.35
Oct. 24	26.10	July 12	28.15	Dec. 6	26.24
May 1, 1945	31.10	Aug. 2	28.40	Feb. 7, 1950	28.60
Nov. 1	29.25	Sept. 10	25.71	Apr. 12	30.09
Apr. 25, 1946	31.86	Oct. 8	24.39	May 26	29.44
Oct. 29	28.85	Nov. 1	24.50	Aug. 4	26.10
May 1, 1947	32.27	Dec. 6	25.54	Oct. 20	25.67
Sept. 8	28.05	Jan. 20, 1949	27.05	Dec. 17	26.94

B7-53-25dc

Date	Water level	Date	Water level	Date	Water level
Sept. 12, 1947	8.24	Sept. 10, 1948	7.54	July 8, 1949	7.97
Oct. 6	9.00	Oct. 10	7.80	Aug. 10	7.69
Nov. 4	9.70	Nov. 1	9.32	Oct. 13	9.33
Dec. 10	10.25	Dec. 6	10.04	Dec. 1	10.45
Jan. 2, 1948	10.54	Jan. 20, 1949	10.08	Feb. 7, 1950	10.78
Feb. 6	10.22	Feb. 8	9.79	Apr. 12	10.39
Mar. 8	9.55	Mar. 3	9.97	May 26	9.32
Apr. 16	9.73	Apr. 8	10.21	Aug. 4	7.88
June 7	8.63	May 4	9.54	Oct. 20	9.76
July 12	7.82	May 31	9.79	Dec. 7	10.23
Aug. 6	8.02				

B7-53-25dd

Date	Water level	Date	Water level	Date	Water level
Sept. 12, 1947	8.80	Oct. 6, 1947	9.47	Nov. 4, 1947	[a]10.25

B7-53-26ab

Date	Water level	Date	Water level	Date	Water level
Oct. 11, 1928	8.50	Nov. 1, 1940	10.32	Nov. 19, 1943	9.10
Apr. 28, 1929	8.75	May 6, 1941	10.55	May 3, 1944	9.36
Aug. 7	8.63	Nov. 5	10.39	Oct. 24	8.98
Oct. 16	8.85	Apr. 17, 1942	9.86	May 1, 1945	10.22
Feb. 9, 1935	9.85	Nov. 20	9.75	Nov. 1	9.65
Apr. 24, 1940	10.26	Apr. 2, 1943	9.91	Apr. 25, 1946	10.25

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO. —Continued

B7-53-26ab—Continued

Date	Water level	Date	Water level	Date	Water level
Oct. 29, 1946	9.79	July 12, 1948	8.89	Aug. 10, 1949	8.45
May 1, 1947	10.26	Aug. 6	9.52	Oct. 13	8.60
Sept. 8	8.65	Sept. 10	8.67	Dec. 6	9.40
Oct. 6	9.40	Oct. 8	8.45	Feb. 7, 1950	9.80
Nov. 4	8.95	Nov. 1	8.72	Apr. 12	9.93
Dec. 11	9.30	Dec. 6	9.04	May 26	10.25
Jan. 2, 1948	9.39	Mar. 3, 1949	9.65	Aug. 4	8.97
Feb. 6	8.69	May 4	10.09	Oct. 20	9.36
Apr. 16	9.60	May 31	10.10	Dec. 7	4.79
June 7	8.93	July 8	8.43		

B7-54-12bc

Date	Water level	Date	Water level	Date	Water level
Oct. 28, 1940	12.51	May 1, 1945	10.55	Dec. 11, 1947	10.88
May 6, 1941	10.92	Nov. 1	10.74	Dec. 30	11.10
Nov. 5	11.48	Apr. 25, 1946	10.15	Feb. 6, 1948	10.88
Apr. 17, 1942	9.46	Oct. 29	11.17	Mar. 12	11.40
Nov. 20	10.48	Sept. 8, 1947	10.95	Apr. 16	10.80
Apr. 2, 1943	10.40	Oct. 6	9.18	June 7	11.16
Nov. 19	11.30	Nov. 4	11.15	July 12	[b]10.55
Oct. 24, 1944	11.64				

B7-54-12cb

Date	Water level	Date	Water level	Date	Water level
Feb. 7, 1950	[c]11.47	May 26, 1950	13.27	Oct. 18, 1950	12.19
Apr. 12	11.11	Aug. 4	11.85	Dec. 2	11.88

B8-51-6ad

Date	Water level	Date	Water level	Date	Water level
July 29, 1947	19.80	July 12, 1948	19.48	May 4, 1949	20.47
Sept. 12	20.05	Aug. 2	19.53	Aug. 10	19.65
Oct. 6	19.80	Sept. 14	19.58	Oct. 12	19.75
Nov. 5	20.30	Oct. 8	21.95	Dec. 6	20.74
Dec. 10	20.98	Nov. 8	20.32	Feb. 7, 1950	21.63
Jan. 2, 1948	21.18	Dec. 6	20.68	Apr. 12	21.16
Feb. 6	21.42	Jan. 17, 1949	21.03	Aug. 4	19.65
Mar. 12	21.31	Feb. 10	21.03	Oct. 20	20.55
Apr. 20	21.05	Mar. 2	21.00	Dec. 7	21.05
June 7	19.53	Apr. 7	21.28		

B8-51-6bd

Date	Water level	Date	Water level	Date	Water level
Sept. 12, 1947	11.14	July 12, 1948	11.58	May 4, 1949	11.60
Oct. 6	11.05	Aug. 2	10.54	June 1	11.42
Nov. 5	11.74	Sept. 14	11.04	July 8	10.74
Dec. 10	11.22	Oct. 8	11.25	Aug. 10	10.55
Jan. 2, 1948	12.30	Nov. 8	11.57	Oct. 13	11.12
Feb. 6	11.77	Dec. 6	11.88	Dec. 6	12.00
Mar. 12	11.55	Feb. 10, 1949	11.86	Feb. 7, 1950	12.49
Apr. 20	11.40	Mar. 2	11.82	Apr. 12	11.99
June 7	10.89	Apr. 7	12.22	May 31	[d]11.06

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B8-52-10ac

Date	Water level	Date	Water level	Date	Water level
Apr. 28, 1929	2.3	Oct. 29, 1946	4.97	Jan. 17, 1949	5.24
Aug. 7	3.2	May 1, 1947	5.55	Feb. 10	5.55
Oct. 16	4.7	Sept. 9	3.76	Mar. 2	5.15
May 19, 1930	3.2	Oct. 6	4.65	Apr. 7	4.99
Feb. 8, 1935	4.8	Nov. 4	4.95	May 4	4.48
Apr. 24, 1940	5.25	Dec. 10	4.70	June 1	4.18
Oct. 30	5.00	Jan. 2, 1948	4.92	July 8	4.32
May 6, 1941	5.10	Feb. 6	5.40	Aug. 10	4.59
Nov. 5	4.60	Mar. 12	5.20	Oct. 13	4.59
Apr. 17, 1942	4.62	Apr. 16	5.30	Dec. 6	5.54
Apr. 2, 1943	5.20	June 7	2.99	Feb. 7, 1950	5.81
Nov. 18	5.20	Aug. 2	4.71	Apr. 12	5.67
May 3, 1944	4.41	Sept. 14	3.20	May 31	3.53
Oct. 25	4.99	Oct. 8	3.99	Aug. 4	4.07
May 2, 1945	5.20	Nov. 8	5.00	Oct. 20	4.76
Nov. 1	4.95	Dec. 6	5.13	Dec. 7	4.55
Apr. 25, 1946	4.95				

B8-52-17cb

Date	Water level	Date	Water level	Date	Water level
Oct. 31, 1940	19.66	Oct. 6, 1947	16.50	Feb. 10, 1949	18.76
May 6, 1941	20.40	Nov. 4	17.30	Mar. 2	18.90
Nov. 5	17.95	Dec. 10	18.04	Apr. 7	19.32
Apr. 17, 1942	20.06	Jan. 2, 1948	18.54	May 4	19.61
Apr. 2, 1943	20.19	Feb. 6	19.07	May 31	18.80
Nov. 19	16.97	Mar. 12	19.60	July 8	17.93
May 3, 1944	19.37	Apr. 16	19.75	Aug. 10	16.85
Oct. 25	16.15	June 7	18.48	Oct. 13	15.91
May 2, 1945	19.53	July 12	17.82	Dec. 1	17.52
Nov. 1	17.77	Aug. 2	17.95	Feb. 7, 1950	18.79
Apr. 25, 1946	19.88	Sept. 14	16.78	Apr. 12	19.25
Oct. 29	17.20	Oct. 8	15.91	May 31	18.01
May 1, 1947	19.94	Nov. 1	16.37	Aug. 4	17.05
July 28	18.50	Dec. 6	17.43	Oct. 20	16.55
Aug. 9	16.88	Jan. 17, 1949	18.32	Dec. 7	17.70

B9-51-16ab1

Date	Water level	Date	Water level	Date	Water level
Sept. 9, 1947	4.50	Oct. 8, 1948	5.42	Aug. 12, 1949	5.13
Oct. 6	5.80	Dec. 7	6.49	Oct. 7	5.86
Nov. 5	6.40	Jan. 17, 1949	6.46	Dec. 6	7.18
Dec. 13	6.70	Mar. 2	6.07	Feb. 8, 1950	7.34
Jan. 2, 1948	6.85	Apr. 7	6.36	Apr. 12	7.32
Feb. 10	6.79	May 4	6.47	May 31	5.82
Apr. 20	6.50	June 1	6.84	Oct. 20	6.32
Aug. 2	5.49	July 8	4.94		

B9-51-31bb

Date	Water level	Date	Water level	Date	Water level
July 28, 1947	3.79	Aug. 2, 1948	4.89	July 8, 1949	3.83
Sept. 12	5.85	Sept. 14	4.60	Aug. 10	4.50
Oct. 6	2.89	Oct. 8	3.95	Oct. 13	4.20
Nov. 5	4.94	Nov. 8	4.23	Dec. 6	5.23
Dec. 10	4.93	Dec. 6	4.75	Feb. 7, 1950	5.26
Jan. 2, 1948	5.08	Jan. 17, 1949	4.60	Apr. 12	5.03
Feb. 6	4.78	Feb. 10	4.09	May 31	5.03
Mar. 12	4.52	Mar. 2	4.45	Aug. 4	6.41
Apr. 20	4.15	Apr. 7	4.58	Oct. 20	5.16
June 7	4.12	May 4	4.68	Dec. 7	5.14
July 12	4.61	June 1	4.14		

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.—Continued

B9-52-35ac

Date	Water level	Date	Water level	Date	Water level
Sept. 9, 1947	10.58	Sept. 14, 1948	10.88	July 8, 1949	11.01
Oct. 6	10.69	Oct. 8	10.45	Aug. 10	11.03
Nov. 5	11.35	Nov. 8	11.23	Oct. 13	10.35
Dec. 10	11.63	Dec. 6	11.65	Dec. 6	11.84
Jan 2, 1948	11.81	Jan. 17, 1949	11.58	Feb. 7, 1950	12.05
Feb. 6	11.91	Feb. 10	11.81	Apr. 12	12.02
Mar. 12	11.90	Mar. 2	11.86	May 31	11.09
Apr. 20	11.90	Apr. 7	11.88	Aug. 4	10.88
June 7	10.57	May 4	11.62	Oct. 20	11.35
July 12	10.96	June 1	11.65	Dec. 7	11.65
Aug. 2	11.04				

B10-48-4bc

Date	Water level	Date	Water level	Date	Water level
June 24, 1948	6.03	Mar. 2, 1949	7.11	Dec. 14, 1949	8.86
Aug. 2	7.77	Apr. 7	6.28	Feb. 8, 1950	9.00
Sept. 14	8.22	May 5	7.28	Apr. 12	8.34
Oct. 8	8.35	June 1	5.53	June 1	8.39
Nov. 8	7.72	July 5	5.70	Aug. 8	8.50
Dec. 7	8.07	Aug. 11	8.55	Oct. 19	6.40
Jan. 17, 1949	7.85	Oct. 7	8.67	Dec. 2	8.28
Feb. 10	7.90				

B10-49-2cb

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1947	5.62	Sept. 14, 1948	5.73	July 7, 1949	5.29
Oct. 7	5.72	Oct. 8	5.61	Aug. 11	5.12
Nov. 5	5.15	Nov. 8	5.30	Oct. 7	5.43
Dec. 13	5.32	Dec. 7	5.31	Dec. 14	5.32
Jan. 3, 1948	5.35	Jan. 17, 1949	5.34	Feb. 8, 1950	5.60
Feb. 10	5.70	Feb. 10	5.54	Apr. 12	5.15
Mar. 12	5.45	Mar. 2	5.04	June 1	4.98
Apr. 20	5.45	Apr. 7	4.38	Aug. 8	4.17
June 8	5.16	May 4	5.18	Oct. 20	5.18
July 8	5.20	June 1	4.48	Dec. 2	5.00
Aug. 2	4.29				

B10-49-8cc

Date	Water level	Date	Water level	Date	Water level
Jan. 3, 1948	15.20	Nov. 8, 1948	13.85	Aug. 11, 1949	10.97
Feb. 10	15.71	Dec. 7	14.16	Oct. 7	12.56
Mar. 12	15.90	Jan. 17, 1949	14.40	Dec. 14	14.45
Apr. 13	16.00	Feb. 10	12.64	Feb. 8, 1950	15.25
June 8	12.30	Mar. 2	11.89	Apr. 12	15.35
July 8	11.87	Apr. 7	13.63	June 1	14.50
Aug. 2	11.39	May 4	13.92	Aug. 8	10.26
Sept. 14	12.48	June 1	14.25	Oct. 20	12.38
Oct. 8	12.46	July 7	13.05	Dec. 2	13.05

B10-49-9cc

Date	Water level	Date	Water level	Date	Water level
Dec. 12, 1947	4.99	July 8, 1948	3.88	Dec. 7, 1948	4.82
Jan. 3, 1948	5.22	Aug. 2	2.31	Mar. 2, 1949	4.28
Feb. 10	5.22	Sept. 14	2.82	Apr. 7	3.62
Mar. 12	5.19	Oct. 8	4.07	May 4	4.17
Apr. 20	4.20	Nov. 8	4.07	June 1	4.13

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-49-9cc—Continued

Date	Water level	Date	Water level	Date	Water level
July 7, 1949	4.14	Dec. 14, 1949	5.46	June 1, 1950	3.82
Aug. 11	3.06	Feb. 8, 1950	6.65	Aug. 8	2.80
Oct. 7	4.61	Apr. 12	4.49	Oct. 20	4.35

B10-50-28cd

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1947	4.64	Apr. 20, 1948	4.65	Dec. 7, 1948	4.25
Oct. 7	4.84	June 8	4.22	Mar. 2, 1949	3.89
Nov. 5	4.50	July 9	4.39	Apr. 7	2.46
Dec. 13	4.95	Aug. 2	4.50	June 1	3.63
Jan. 3, 1948	5.04	Sept. 14	4.82	July 7	3.37
Feb. 10	4.84	Oct. 8	4.65	Aug. 11	[a]4.53
Mar. 12	4.70				

B10-51-24aa

Date	Water level	Date	Water level	Date	Water level
Sept. 9, 1947	12.92	June 8, 1948	22.07	Feb. 10, 1949	22.27
Oct. 7	14.13	July 9	21.58	Mar. 2	22.39
Nov. 5	16.99	Aug. 2	17.91	Apr. 7	23.09
Dec. 13	19.35	Sept. 14	17.35	May 4	23.46
Jan. 3, 1948	20.32	Oct. 8	16.58	June 1	24.03
Feb. 10	21.70	Nov. 8	18.59	July 8	20.89
Mar. 12	22.55	Dec. 7	20.02	Aug. 11	[a]14.64
Apr. 20	19.40	Jan. 17, 1949	21.55		

MORGAN COUNTY, COLO.

B1-55-18bc1

Date	Water level	Date	Water level	Date	Water level
Nov. 27, 1940	34.60	Aug. 6, 1947	38.00	Apr. 11, 1949	39.68
May 6, 1941	34.39	Oct. 2	39.15	May 3	39.69
Nov. 5	35.62	Nov. 3	38.92	May 30	40.10
Apr. 17, 1942	33.16	Dec. 9	38.22	July 4	39.67
Nov. 20	34.49	Dec. 31	38.38	Aug. 4	41.96
Apr. 2, 1943	34.09	Feb. 3, 1948	38.39	Oct. 11	42.18
Nov. 19	36.42	Mar. 8	37.94	Dec. 5	41.91
May 4, 1944	35.60	Apr. 14	37.80	Feb. 6, 1950	41.36
Oct. 24	38.66	June 2	39.77	Apr. 6	41.00
May 1, 1945	37.42	July 5	40.60	May 31	42.30
Nov. 1	37.45	Sept. 1	41.16	Aug. 7	44.50
Apr. 25, 1946	37.26	Oct. 7	41.28	Oct. 16	44.23
Oct. 29	37.15	Nov. 2	40.95	Dec. 4	43.41
May 1, 1947	37.19	Dec. 8	40.47		

B1-55-19ad

Date	Water level	Date	Water level	Date	Water level
Mar. 30, 1948	32.85	Nov. 2, 1948	34.60	May 3, 1949	33.28
May 14	33.35	Dec. 8	34.40	May 30	34.08
June 2	32.95	Jan 19, 1949	34.10	July 4	34.09
July 5	33.57	Feb. 7	34.08	Aug. 4	34.00
Aug. 2	34.22	Mar. 8	34.80	Oct. 11	37.30
Sept. 1	34.42	Apr. 11	34.35	Dec. 1	[d]34.30
Oct. 7	35.33				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

Date	Water level	Date	Water level	Date	Water level
MORGAN COUNTY, COLO.—Continued					
B1-55-31da					
Nov. 27, 1940	33.87	Aug. 8, 1947	37.20	Sept. 1, 1948	38.61
Nov. 5, 1941	33.62	Oct. 2	33.22	Oct. 7	38.01
Apr. 17, 1942	30.91	Dec. 31	32.86	Dec. 8	36.74
Nov. 20	31.34	Feb. 3, 1948	33.91	Mar. 8, 1949	35.90
Apr. 2, 1943	31.29	Mar. 8	34.29	May 3	35.79
Nov. 19	33.85	Apr. 14	33.60	May 30	36.30
Oct. 24, 1944	34.62	May 14	33.80	Oct. 11	37.69
May 1, 1945	34.01	June 2	35.83	Dec. 1	36.63
Nov. 1	33.30	July 5	36.76	Feb. 6, 1950	36.00
Oct. 29, 1946	32.90	Aug. 2	38.89	Dec. 4	36.70
May 1, 1947	33.70				
B1-56-1cd2					
Mar. 30, 1948	35.60	Mar. 8, 1949	37.78	Aug. 4, 1949	37.35
May 14	36.40	May 30	37.62	Aug. 7, 1950	40.85
Aug. 2	37.99	July 4	37.65		
B1-56-1dc					
Nov. 27, 1940	31.84	May 1, 1947	34.82	Dec. 8, 1948	38.78
May 6, 1941	31.70	Oct. 2	38.00	Jan. 19, 1949	38.37
Nov. 5	32.59	Nov. 3	36.86	Feb. 7	38.19
Apr. 17, 1942	31.30	Dec. 9	36.45	Apr. 11	38.28
Nov. 20	31.95	Dec. 31	36.64	Aug. 4	40.82
Apr. 2, 1943	31.64	Feb. 2, 1948	35.83	Oct. 11	42.75
Nov. 19	33.10	Mar. 8	36.19	Dec. 5	39.86
May 4, 1944	32.97	Apr. 14	36.00	Feb. 6, 1950	39.86
Oct. 24	35.07	July 5	38.54	Apr. 6	39.35
May 1, 1945	34.63	Sept. 1	40.59	May 31	42.39
Nov. 1	35.57	Oct. 8	41.69	Oct. 16	42.80
Apr. 25, 1946	35.02	Nov. 2	39.68	Dec. 4	41.91
Oct. 29	34.40				
B1-56-13cc					
Aug. 14, 1947	42.55	Feb. 7, 1949	42.60	Dec. 1, 1949	45.17
Mar. 30, 1948	42.55	Mar. 8	45.27	Feb. 6, 1950	44.31
May 14	42.40	Apr. 11	43.54	Apr. 6	44.11
June 2	42.61	May 3	43.26	May 31	44.83
Sept. 1	43.66	May 30	43.40	Aug. 17	45.85
Oct. 7	43.88	July 4	43.69	Oct. 16	46.16
Nov. 2	43.57	Aug. 4	43.89	Dec. 4	46.14
Dec. 8	44.82	Oct. 11	44.66		
B1-59-4dc					
Oct. 16, 1947	53.55	Apr. 13, 1948	54.20	Dec. 6, 1948	54.07
Nov. 4	54.23	June 4	54.07	Jan. 14, 1949	53.96
Dec. 3	54.10	June 30	54.06	Feb. 14	54.05
Jan. 8, 1948	54.20	Sept. 8	53.33	Mar. 15	54.08
Feb. 3	54.06	Oct. 4	53.99	Apr. 18	54.07
Mar. 3	54.23	Nov. 4	54.11	May 4	54.05

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B1-59-4dc—Continued

Date	Water level	Date	Water level	Date	Water level
June 6, 1949	54.10	Aug. 1, 1949	54.08	Dec. 12, 1949	[d]54.16
July 11	54.05	Oct. 17	53.94		

B1-59-18cc

Date	Water level	Date	Water level	Date	Water level
Nov. 25, 1947	15.80	Apr. 18, 1949	17.37	Feb. 27, 1950	18.16
Apr. 30, 1948	14.45	Apr. 25	17.26	Mar. 6	18.04
June 21	[e]23.34	May 2	17.23	Mar. 13	18.10
June 23	16.58	May 9	17.05	Mar. 20	18.07
June 30	16.09	May 16	16.91	Mar. 27	18.01
July 7	16.46	May 23	16.84	Apr. 3	17.99
July 14	[e]23.16	May 30	16.84	Apr. 10	17.99
July 21	[e]22.02	June 6	[e]22.54	Apr. 17	17.93
July 28	[e]25.72	June 13	[f]16.64	Apr. 24	17.92
Aug. 4	19.17	June 20	[f]16.25	May 1	17.75
Aug. 11	18.88	June 27	[e]21.64	May 8	17.75
Aug. 18	[e]24.65	July 4	[e]23.34	May 15	17.75
Aug. 25	[e]26.95	July 11	18.30	May 22	[e]24.92
Sept. 1	[e]27.84	July 18	[e]24.60	May 29	17.98
Sept. 8	[e]28.17	July 25	[e]20.75	June 5	[e]25.39
Sept. 15	[e]27.93	Aug. 1	[e]22.73	June 12	[e]28.65
Sept. 22	[e]25.28	Aug. 8	[e]23.15	June 19	[e]28.59
Sept. 29	[e]26.08	Aug. 15	[e]23.95	June 26	21.35
Oct. 6	[e]25.37	Aug. 22	18.93	July 3	[e]30.41
Oct. 13	[e]27.11	Aug. 29	[e]26.02	July 10	[e]28.45
Oct. 20	[e]27.11	Sept. 5	[e]26.56	July 17	[e]32.23
Oct. 27	20.03	Sept. 12	[e]26.92	July 24	[e]27.40
Nov. 3	19.41	Sept. 19	19.90	July 31	[e]27.29
Nov. 10	19.26	Sept. 26	20.34	Aug. 7	[e]33.47
Nov. 17	19.07	Oct. 3	[e]26.00	Aug. 14	[e]33.93
Nov. 24	18.92	Oct. 10	20.15	Aug. 21	[e]34.99
Dec. 1	18.89	Oct. 17	19.83	Aug. 28	[e]28.45
Dec. 8	18.83	Oct. 24	19.65	Sept. 4	[e]37.66
Dec. 15	18.70	Oct. 31	19.31	Sept. 11	[e]34.84
Dec. 22	18.60	Nov. 7	19.22	Sept. 18	26.57
Dec. 29	18.55	Nov. 14	19.11	Sept. 25	[e]29.53
Jan. 6, 1949	18.47	Nov. 21	19.02	Oct. 2	25.19
Jan. 12	18.35	Nov. 28	18.87	Oct. 9	24.57
Jan. 19	18.28	Dec. 5	18.72	Oct. 17	24.30
Jan. 24	18.28	Dec. 12	18.74	Oct. 23	24.12
Jan. 31	18.19	Dec. 19	18.68	Oct. 30	23.76
Feb. 7	18.03	Dec. 26	18.62	Nov. 6	23.54
Feb. 14	18.07	Jan. 2, 1950	18.80	Nov. 13	23.19
Feb. 21	18.03	Jan. 9	18.59	Nov. 20	23.10
Feb. 28	17.86	Jan. 16	18.50	Nov. 27	22.87
Mar. 7	17.75	Jan. 23	18.19	Dec. 4	22.67
Mar. 14	17.78	Jan. 30	18.37	Dec. 11	22.57
Mar. 21	17.75	Feb. 6	18.28	Dec. 18	22.44
Mar. 28	17.67	Feb. 14	18.29	Dec. 25	22.23
Apr. 4	17.64	Feb. 20	18.18	Jan. 1, 1951	22.14
Apr. 11	17.48				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-2dd

Date	Water level	Date	Water level	Date	Water level
July 17, 1947	37.74	June 4, 1948	39.41	June 6, 1949	38.70
Aug. 26	38.80	Sept. 8	41.89	Aug. 3	39.39
Oct. 3	38.80	Oct. 4	40.13	Oct. 12	42.14
Nov. 4	37.80	Nov. 4	39.97	Dec. 12	39.74
Dec. 4	37.12	Dec. 6	39.29	Feb. 1, 1950	39.18
Jan. 8, 1948	36.90	Jan. 14, 1949	38.84	Apr. 10	39.08
Feb. 3	36.74	Feb. 14	37.73	Aug. 2	41.32
Mar. 3	36.54	Apr. 14	38.69	Dec. 14	42.25
Apr. 13	36.47				

B1-60-12cc

Date	Water level	Date	Water level	Date	Water level
Oct. 30, 1946	33.07	July 2, 1948	35.84	May 2, 1949	33.60
Apr. 30, 1947	30.16	Aug. 13	41.99	June 6	34.97
Oct. 3	37.50	Oct. 4	42.03	Oct. 18	39.48
Nov. 4	34.27	Nov. 4	37.47	Dec. 12	36.58
Dec. 3	33.12	Dec. 6	36.21	Feb. 1, 1950	35.27
Jan. 8, 1948	32.41	Jan. 14, 1949	35.03	Apr. 10	34.39
Feb. 3	31.92	Feb. 7	34.63	May 22	37.30
Mar. 3	31.64	Mar. 15	34.15	Dec. 14	39.89
Apr. 13	31.15	Apr. 14	33.89		

B1-60-23bc

Date	Water level	Date	Water level	Date	Water level
Apr. 18, 1942	14.50	Dec. 3, 1947	18.24	Apr. 14, 1949	16.98
Nov. 19	15.83	Jan. 8, 1948	17.38	May 4	17.22
Apr. 1, 1943	14.29	Feb. 3	16.95	June 17	16.89
Nov. 18	18.34	Mar. 3	16.77	July 11	18.83
May 1, 1944	15.13	Apr. 13	16.51	Aug. 3	20.43
Oct. 26	20.15	Aug. 4	21.57	Oct. 17	18.82
May 3, 1945	15.94	Sept. 1	20.51	Dec. 12	17.54
Oct. 31	18.31	Oct. 4	19.12	Feb. 3, 1950	17.07
Oct. 30, 1946	18.57	Nov. 4	18.35	Apr. 10	16.98
Apr. 30, 1947	15.83	Dec. 6	17.79	Oct. 17	22.32
Nov. 4	19.50	Mar. 15, 1949	16.83	Dec. 14	19.90

B1-60-26cc

Date	Water level	Date	Water level	Date	Water level
Nov. 29, 1940	18.2	Apr. 1, 1943	17.3	Oct. 31, 1945	19.18
May 7, 1941	21.3	Nov. 18	18.4	Oct. 30, 1946	22.05
Nov. 4	18.6	May 1, 1944	17.7	Apr. 30, 1947	18.37
Apr. 18, 1942	17.8	May 3, 1945	18.5	Oct. 3	22.45
Nov. 19	17.9				

B1-60-27dd

Date	Water level	Date	Water level	Date	Water level
Nov. 4, 1947	[g]20.44	Dec. 6, 1948	21.14	June 17, 1949	20.54
Dec. 3	19.17	Jan. 14, 1949	20.93	Oct. 17	21.69
Jan. 8, 1948	19.03	Feb. 7	20.85	Dec. 12	20.99
Feb. 3	19.98	Mar. 15	20.87	Feb. 3, 1950	20.83
Mar. 3	19.92	Apr. 14	20.79	Apr. 10	20.83
Apr. 13	19.79	May 4	[h]32.50	Dec. 14	21.94
Nov. 4	21.56				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-34cc

Date	Water level	Date	Water level	Date	Water level
Oct. 8, 1947	27.03	Oct. 4, 1948	27.78	Oct. 17, 1949	28.79
Nov. 4	26.06	Nov. 4	26.52	Dec. 12	27.98
Nov. 28	25.98	Dec. 6	26.40	Feb. 3, 1950	27.67
Dec. 3	25.83	Jan. 14, 1949	26.52	Apr. 10	27.46
Jan. 8, 1948	25.63	Feb. 7	26.71	May 22	29.10
Feb. 3	25.69	Mar. 15	26.83	Aug. 2	33.79
Mar. 3	25.66	Apr. 14	26.89	Oct. 17	30.51
Apr. 13	25.80	May 4	27.00	Dec. 14	28.99
June 4	29.60	June 17	26.63		
June 30	28.06	July 11	29.58		

B2-55-30bc1

Date	Water level	Date	Water level	Date	Water level
Oct. 24, 1944	22.57	Mar. 8, 1948	21.85	Mar. 8, 1949	24.42
May 1, 1945	21.13	Apr. 14	21.58	Apr. 11	22.69
Nov. 1	21.18	May 14	23.90	May 3	23.55
Apr. 25, 1946	20.40	June 2	25.04	May 30	[i]30.10
Oct. 29	21.44	July 5	25.32	Aug. 4	25.87
May 1, 1947	20.52	Aug. 2	26.80	Oct. 11	24.30
Aug. 6	25.00	Sept. 1	27.72	Dec. 5	23.39
Oct. 2	23.37	Oct. 7	26.09	Feb. 6, 1950	22.91
Nov. 3	22.84	Nov. 2	25.05	Apr. 6	22.61
Dec. 9	21.99	Dec. 8	24.55	May 31	24.06
Dec. 31	21.82	Jan. 19, 1949	24.14	Oct. 16	25.95
Feb. 2, 1948	22.00	Feb. 7	23.99	Dec. 4	25.17

B2-56-1dd3

Date	Water level	Date	Water level	Date	Water level
Sept. 10, 1936	16.9	Oct. 24, 1944	15.63	July 7, 1948	15.29
Nov. 12	16.2	May 1, 1945	14.65	Aug. 2	15.29
Apr. 29, 1937	15.08	Nov. 1	14.75	Sept. 1	15.49
Oct. 29	16.57	Apr. 25, 1946	14.41	Oct. 7	16.51
May 3, 1938	15.45	Oct. 29	14.62	Nov. 2	15.68
Dec. 9	14.93	May 1, 1947	14.35	Dec. 8	15.07
Apr. 26, 1939	14.19	Aug. 6	15.04	Mar. 8, 1949	14.28
Oct. 26	15.81	Oct. 2	15.44	Apr. 11	14.08
Apr. 24, 1940	14.80	Nov. 3	15.15	May 3	13.87
Nov. 27	15.03	Dec. 9	15.07	May 30	13.78
May 6, 1941	14.51	Dec. 31	14.63	July 4	15.36
Nov. 5	15.21	Feb. 2, 1948	14.62	Aug. 4	14.53
Apr. 17, 1942	13.84	Mar. 8	14.53	Oct. 11	16.32
Nov. 20	14.91	Apr. 14	14.60	Dec. 5	14.83
May 2, 1943	14.60	May 14	16.20	Feb. 6, 1950	14.48
Nov. 19	15.28	June 2	14.54	Apr. 6	[d]14.25
May 4, 1944	14.56				

B2-56-12da1

Date	Water level	Date	Water level	Date	Water level
July 18, 1947	14.25	Sept. 17, 1947	15.38	Nov. 12, 1947	14.23
July 31	14.45	Sept. 24	15.13	Nov. 19	14.17
Aug. 6	14.41	Oct. 1	14.91	Nov. 26	14.01
Aug. 13	14.84	Oct. 8	14.88	Dec. 3	13.97
Aug. 20	15.75	Oct. 15	14.79	Dec. 10	13.87
Aug. 27	16.04	Oct. 22	14.70	Dec. 17	13.77
Sept. 3	15.91	Oct. 29	14.54	Dec. 24	13.73
Sept. 10	15.63	Nov. 5	14.36	Dec. 31	13.65

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B2-56-12da1—Continued

Date	Water level	Date	Water level	Date	Water level
Jan. 7, 1948	13.63	Jan. 12, 1949	14.61	Jan. 16, 1950	14.53
Jan. 14	13.57	Jan. 19	14.47	Jan. 23	14.42
Jan. 21	13.50	Jan. 24	14.44	Jan. 30	14.39
Jan. 28	13.42	Jan. 31	14.30	Feb. 6	14.22
Feb. 4	13.42	Feb. 7	14.12	Feb. 13	14.22
Feb. 11	13.41	Feb. 14	14.08	Feb. 20	14.07
Feb. 18	13.33	Feb. 21	13.99	Feb. 27	13.98
Feb. 25	13.37	Feb. 28	13.88	Mar. 6	13.91
Mar. 3	13.33	Mar. 7	13.79	Mar. 13	13.96
Mar. 10	13.27	Mar. 14	13.79	Mar. 20	13.95
Mar. 17	13.17	Mar. 21	13.82	Mar. 27	14.00
Mar. 24	13.17	Mar. 28	13.72	Apr. 3	13.80
Mar. 31	13.18	Apr. 4	13.66	Apr. 10	13.92
Apr. 7	13.21	Apr. 11	13.45	Apr. 17	13.83
Apr. 14	13.11	Apr. 18	13.48	Apr. 24	14.08
Apr. 21	13.28	Apr. 25	13.40	May 1	14.12
Apr. 28	14.03	May 2	14.24	May 8	14.95
May 5	15.30	May 9	14.41	May 15	14.79
May 12	15.23	May 16	13.77	May 22	15.69
May 21	15.68	May 23	13.65	May 29	15.82
May 26	16.11	May 30	13.90	June 5	16.84
June 2	15.79	June 6	15.01	June 12	17.04
June 9	15.52	June 13	14.40	June 19	17.22
June 16	15.77	June 20	14.06	June 25	17.72
June 23	16.56	June 27	14.35	July 3	18.00
June 30	16.09	July 4	14.97	July 10	18.15
July 7	15.62	July 11	15.87	July 17	18.33
July 14	16.62	July 18	16.47	July 24	18.17
July 21	16.76	July 25	17.01	July 31	18.43
July 28	16.61	Aug. 1	16.86	Aug. 7	18.60
Aug. 4	16.24	Aug. 8	17.55	Aug. 14	18.68
Aug. 11	16.72	Aug. 15	17.47	Aug. 21	19.03
Aug. 18	16.96	Aug. 22	17.90	Aug. 28	19.39
Aug. 25	16.67	Aug. 29	18.00	Sept. 4	19.48
Sept. 1	16.88	Sept. 5	17.40	Sept. 11	19.52
Sept. 8	16.68	Sept. 12	17.26	Sept. 19	18.71
Sept. 15	16.77	Sept. 19	17.29	Sept. 25	18.02
Sept. 22	17.42	Sept. 26	17.54	Oct. 2	17.60
Sept. 29	17.01	Oct. 3	17.01	Oct. 9	17.38
Oct. 6	16.90	Oct. 10	16.92	Oct. 17	17.17
Oct. 13	16.58	Oct. 17	16.71	Oct. 23	17.35
Oct. 20	16.29	Oct. 24	16.64	Oct. 30	17.47
Oct. 27	16.21	Oct. 31	16.24	Nov. 6	17.84
Nov. 3	16.07	Nov. 7	16.06	Nov. 13	17.08
Nov. 10	15.98	Nov. 14	15.84	Nov. 20	16.69
Nov. 17	15.93	Nov. 21	15.65	Nov. 27	16.43
Nov. 24	15.80	Nov. 28	15.45	Dec. 4	16.19
Dec. 1	15.60	Dec. 5	15.29	Dec. 11	16.03
Dec. 8	15.39	Dec. 12	15.17	Dec. 18	15.88
Dec. 15	15.23	Dec. 19	15.00	Dec. 25	15.64
Dec. 22	15.07	Dec. 26	14.87	Jan. 1, 1951	15.50
Dec. 29	14.98	Jan. 2, 1950	14.74		
Jan. 5, 1949	14.74	Jan. 9	14.60		

B2-56-13aa1

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1928	7.92	May 19, 1930	3.99	May 26, 1933	4.05
Apr. 29, 1929	4.28	July 31	6.08	Oct. 11	5.32
Aug. 6	7.50	Oct. 24	4.88	Apr. 24, 1934	4.47
Oct. 16	6.37	Nov. 15, 1932	4.55	Oct. 1	5.48

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B2-56-13aa1—Continued

Date	Water level	Date	Water level	Date	Water level
Mar. 28, 1935	4.40	Apr. 17, 1942	3.42	Dec. 31, 1947	5.76
Oct. 15	3.85	Nov. 20	5.00	Feb. 3, 1948	5.49
Apr. 22, 1936	3.83	Apr. 2, 1943	4.32	Mar. 8	5.15
Sept. 10	6.70	Nov. 19	6.09	Apr. 14	6.00
Nov. 22	5.51	May 4, 1944	4.59	May 14	[j]9.20
Apr. 29, 1937	4.55	Oct. 24	6.90	June 2	[j]11.16
Oct. 29	5.92	May 1, 1945	4.99	July 5	7.88
May 3, 1938	4.85	Nov. 1	5.18	Aug. 2	8.95
Dec. 9	3.95	Apr. 25, 1946	4.84	Sept. 1	9.02
Apr. 26, 1939	3.18	Oct. 29	5.80	Oct. 7	9.06
Oct. 26	6.52	May 1, 1947	4.55	Dec. 8	7.67
Apr. 24, 1940	4.86	July 23	4.10	Feb. 7, 1949	6.58
Nov. 27	5.80	Oct. 2	7.07	Apr. 11	3.45
May 6, 1941	4.67	Nov. 3	6.50	May 30	6.05
Nov. 5	6.05	Dec. 9	5.90	July 4	[k]3.91

B2-56-13aa2

Date	Water level	Date	Water level	Date	Water level
Aug. 4, 1949	[l]12.05	Feb. 6, 1950	8.89	Aug. 7, 1950	14.55
Oct. 11	13.46	Apr. 6	9.54	Oct. 16	13.23
Dec. 5	10.85	May 31	11.04	Dec. 4	12.14

B2-56-24ca2

Date	Water level	Date	Water level	Date	Water level
Mar. 29, 1948	18.20	Nov. 2, 1948	20.45	Oct. 11, 1949	[m]26.56
May 14	19.65	Dec. 8	20.27	Dec. 5	20.90
June 2	[m]25.20	Feb. 7, 1949	19.74	Feb. 6, 1950	19.98
July 7	20.21	Mar. 8	19.77	Apr. 6	20.37
Aug. 2	[m]25.86	May 3	19.41		

B2-56-24dd2

Date	Water level	Date	Water level	Date	Water level
Apr. 29, 1929	13.77	Apr. 26, 1939	11.50	May 14, 1948	16.80
Aug. 6	15.98	Oct. 26	15.75	June 2	[n]33.89
Oct. 16	15.81	Apr. 24, 1940	14.38	July 5	19.44
May 19, 1930	12.79	July 14	16.35	Aug. 2	20.19
July 31	14.83	Nov. 27	15.48	Nov. 2	19.91
Oct. 24	13.59	May 6, 1941	14.49	Dec. 8	19.65
Nov. 15, 1932	13.48	Nov. 5	15.65	Jan. 19, 1949	19.32
May 26, 1933	12.78	Apr. 7, 1942	12.12	Feb. 7	19.91
Oct. 11	14.33	Nov. 20	14.57	Mar. 8	18.93
Apr. 24, 1934	13.58	Apr. 2, 1943	13.87	Apr. 11	18.68
Oct. 1	14.33	Nov. 19	16.18	July 4	18.89
Apr. 28, 1935	13.56	May 4, 1944	15.05	Oct. 11	21.25
Oct. 15	11.86	Oct. 24	17.29	Dec. 5	20.39
Apr. 22, 1936	11.75	May 1, 1945	15.92	Feb. 6, 1950	19.87
Sept. 10	14.94	Nov. 1	15.66	Apr. 6	19.46
Nov. 12	14.45	Apr. 25, 1946	14.96	May 31	20.54
Oct. 29, 1937	15.30	Oct. 29	16.05	Aug. 7	22.05
May 3, 1938	14.32	July 25, 1947	16.50	Oct. 16	22.39
Dec. 9	12.70	Mar. 30, 1948	16.00	Dec. 4	21.69

B2-57-6dc

Date	Water level	Date	Water level	Date	Water level
June 9, 1947	21.71	Jan. 5, 1948	21.68	May 17, 1948	22.25
Oct. 1	23.06	Feb. 5	21.60	June 1	21.90
Nov. 3	22.17	Mar. 3	21.53	Aug. 9	[n]45.90
Dec. 2	21.85	Apr. 13	20.40	Sept. 10	24.02

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-57-6dc—Continued

Date	Water level	Date	Water level	Date	Water level
Oct. 1, 1948	24.25	June 17, 1949	22.41	Feb. 2, 1950	22.18
Nov. 4	23.10	July 12	23.50	Apr. 7	21.99
Dec. 2	22.71	Aug. 3	26.19	May 25	22.99
Mar. 15, 1949	22.17	Oct. 17	23.69	Dec. 14	24.60
Apr. 13	21.94	Dec. 12	22.45		

B2-57-29ad

Date	Water level	Date	Water level	Date	Water level
July 14, 1947	46.21	June 1, 1948	45.82	July 12, 1949	49.06
Aug. 18	47.18	July 2	46.65	Aug. 3	49.98
Oct. 1	48.00	Aug. 9	48.81	Oct. 17	48.69
Nov. 3	45.87	Sept. 9	47.75	Dec. 12	47.75
Dec. 2	45.28	Oct. 1	47.57	Feb. 2, 1950	47.04
Jan. 5, 1948	45.04	Nov. 4	46.78	Apr. 7	46.59
Feb. 5	44.99	Dec. 2	46.44	May 25	48.48
Mar. 3	44.75	Mar. 15, 1949	45.66	Aug. 1	51.19
Apr. 13	44.54	May 3	45.97	Oct. 16	50.60
May 17	44.75	June 17	45.95	Dec. 14	49.95

B2-57-30da

Date	Water level	Date	Water level	Date	Water level
May 26, 1947	49.30	July 2, 1948	49.94	June 17, 1949	50.57
July 14	49.10	Aug. 9	50.11	July 12	50.68
Aug. 18	49.36	Sept. 10	50.34	Aug. 3	50.95
Oct. 1	49.77	Oct. 1	50.52	Oct. 17	51.70
Nov. 3	49.90	Nov. 4	50.73	Dec. 12	51.90
Dec. 2	49.94	Dec. 2	50.79	Feb. 2, 1950	51.88
Jan. 5, 1948	49.91	Jan. 13, 1949	50.73	Apr. 7	50.83
Feb. 5	49.84	Mar. 15	50.70	May 25	51.73
Apr. 13	49.75	Apr. 13	50.19	Aug. 1	52.40
June 1	49.71	May 3	50.30	Dec. 14	54.14

B2-57-32da

Date	Water level	Date	Water level	Date	Water level
June 5, 1947	42.98	June 1, 1948	43.58	June 17, 1949	44.76
July 14	47.10	July 2	44.02	July 12	45.09
Aug. 18	41.70	Aug. 9	46.50	Aug. 3	47.45
Oct. 1	43.65	Sept. 9	45.23	Oct. 17	45.82
Nov. 3	45.59	Oct. 1	45.30	Dec. 12	45.15
Dec. 2	44.50	Nov. 4	45.63	Feb. 2, 1950	45.35
Jan. 5, 1948	43.68	Feb. 11, 1949	45.25	Apr. 7	46.19
Feb. 5	43.67	Mar. 15	44.43	May 25	45.58
Mar. 3	43.56	Apr. 13	44.89	Aug. 1	47.00
Apr. 13	44.55	May 3	44.52	Oct. 16	54.25
May 17	45.10				

B2-60-4dd

Date	Water level	Date	Water level	Date	Water level
May 1, 1944	53.28	Dec. 4, 1947	55.59	Oct. 4, 1948	58.37
Oct. 26	54.32	Jan. 9, 1948	55.42	Nov. 4	57.09
Apr. 30, 1945	53.74	Feb. 3	55.22	Dec. 6	56.65
Oct. 31	54.39	Mar. 10	55.25	Jan. 14, 1949	56.30
Oct. 28, 1946	54.94	Apr. 13	55.20	Feb. 14	56.38
Apr. 30, 1947	54.59	June 3	56.29	Mar. 15	55.78
Aug. 26	58.47	July 2	56.44	Apr. 14	55.87
Nov. 4	56.09	Sept. 15	59.25	May 4	59.61

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-60-4dd—Continued

Date	Water level	Date	Water level	Date	Water level
June 6, 1949	56.25	Dec. 9, 1949	57.07	May 22, 1950	55.60
July 11	60.10	Feb. 1, 1950	56.79	Oct. 14	59.26
Oct. 12	58.45	Apr. 10	56.70	Dec. 9	58.25

B2-60-10cc1

Date	Water level	Date	Water level	Date	Water level
Aug. 26, 1947	57.68	June 3, 1948	56.15	Mar. 15, 1949	56.28
Sept. 19	57.16	July 2	57.31	Apr. 14	56.37
Oct. 3	58.07	Aug. 13	[o]62.45	May 4	55.62
Nov. 4	55.47	Sept. 1	[o]63.59	June 6	56.10
Dec. 4	56.32	Oct. 4	57.86	Aug. 2	[o]66.00
Jan. 9, 1948	55.53	Nov. 4	57.14	Oct. 12	58.23
Feb. 3	55.35	Dec. 6	56.74	Dec. 9	57.37
Mar. 10	55.25	Jan. 14, 1949	56.35	Feb. 1, 1950	[P]57.05
Apr. 13	55.20	Feb. 14	56.90		

B2-60-13dd

Date	Water level	Date	Water level	Date	Water level
Apr. 25, 1940	44.47	Oct. 2, 1947	50.55	Feb. 14, 1949	49.95
Nov. 29	45.45	Nov. 4	49.48	Mar. 14	49.88
May 27, 1941	44.80	Dec. 4	48.91	Apr. 14	50.69
Nov. 4	46.57	Jan. 8, 1948	49.46	May 2	49.69
Apr. 18, 1942	45.30	Feb. 3	48.35	June 6	49.88
Nov. 19	46.25	Mar. 3	48.17	July 11	51.28
Apr. 1, 1943	45.30	Apr. 13	48.02	Aug. 2	53.02
Nov. 18	46.84	June 4	49.35	Oct. 10	52.97
May 1, 1944	45.68	July 2	50.36	Dec. 12	51.10
Oct. 26	47.87	Aug. 13	52.39	Feb. 1, 1950	50.54
May 3, 1945	45.96	Sept. 15	53.73	Apr. 10	50.17
Oct. 31	46.78	Oct. 4	52.14	May 22	50.92
Apr. 24, 1946	46.32	Nov. 4	51.23	Oct. 17	54.84
Oct. 30	47.92	Dec. 6	50.75	Dec. 14	53.08
Apr. 4, 1947	46.83	Jan. 14, 1949	49.18		

B2-60-21ad

Date	Water level	Date	Water level	Date	Water level
Mar. 18, 1948	62.48	Jan. 14, 1949	62.84	Oct. 12, 1949	63.17
June 3	62.69	Feb. 14	62.98	Dec. 9	63.14
July 2	62.79	Mar. 15	63.06	Feb. 1, 1950	63.32
Aug. 13	62.85	Apr. 14	63.22	Apr. 10	63.50
Sept. 1	61.50	May 4	63.05	May 22	63.35
Oct. 4	62.83	June 6	63.09	Aug. 2	63.49
Nov. 4	62.89	July 11	63.80	Oct. 17	63.58
Dec. 6	62.97	Aug. 2	63.24	Dec. 14	63.58

B2-60-25da

Date	Water level	Date	Water level	Date	Water level
July 17, 1947	44.99	Apr. 13, 1948	46.00	Feb. 14, 1949	48.44
Aug. 21	45.70	June 4	46.18	Mar. 15	48.34
Oct. 3	44.60	July 2	46.88	Apr. 14	48.08
Nov. 4	46.48	Aug. 13	48.25	May 2	48.23
Dec. 4	46.40	Sept. 1	48.75	June 6	47.94
Jan. 8, 1948	46.30	Oct. 4	49.01	July 11	48.69
Feb. 3	46.15	Dec. 6	48.91	Aug. 3	49.76
Mar. 3	46.00	Jan. 14, 1949	48.80	Oct. 10	51.27

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B2-60-25da—Continued

Date	Water level	Date	Water level	Date	Water level
Dec. 12, 1949	50.40	May 22, 1950	49.05	Oct. 17, 1950	54.52
Feb. 1, 1950	49.87	Aug. 2	52.79	Dec. 14	53.77
Apr. 10	49.40				

B2-60-26dd

Date	Water level	Date	Water level	Date	Water level
Apr. 25, 1940	50.35	Oct. 30, 1946	57.8	Feb. 14, 1949	61.90
Nov. 29	51.46	Apr. 30, 1947	54.88	Mar. 15	60.30
May 7, 1941	50.32	Oct. 3	66.68	Apr. 14	60.43
Nov. 4	52.80	Nov. 4	60.99	May 2	60.07
Apr. 18, 1942	51.00	Dec. 4	59.29	June 6	60.28
Nov. 19	52.69	Jan. 8, 1948	58.83	July 11	61.43
Apr. 1, 1943	51.33	Feb. 3	58.22	Oct. 10	66.80
Nov. 18	54.47	Mar. 3	57.96	Dec. 12	63.83
May 1, 1944	52.12	Apr. 13	57.35	Feb. 1, 1950	62.69
Oct. 26	55.90	June 4	58.96	Apr. 10	62.73
May 3, 1945	52.98	July 2	60.22	May 22	61.53
Oct. 31	55.10	Nov. 4	64.49	Oct. 17	68.68
Apr. 24, 1946	53.49	Dec. 6	63.10	Dec. 14	67.22

B3-56-7cb

Date	Water level	Date	Water level	Date	Water level
Nov. 26, 1940	31.46	Oct. 2, 1947	24.25	Feb. 11, 1949	27.47
May 7, 1941	32.35	Nov. 7	23.90	Mar. 8	27.97
Nov. 5	28.93	Dec. 15	24.56	Apr. 12	29.79
Apr. 7, 1942	30.90	Jan. 6, 1948	25.09	May 6	29.60
Nov. 20	27.62	Feb. 3	24.33	May 30	28.98
Apr. 2, 1943	28.72	Mar. 10	26.10	July 11	28.44
Nov. 19	24.73	Apr. 15	26.75	Aug. 2	27.60
May 4, 1944	27.27	May 17	27.00	Oct. 14	24.92
Oct. 24	25.75	June 2	26.66	Dec. 12	25.00
May 1, 1945	28.07	July 2	26.64	Feb. 1, 1950	25.92
Nov. 1	25.53	Aug. 9	27.79	Apr. 18	27.23
Apr. 25, 1946	27.96	Sept. 2	26.44	June 6	27.75
Oct. 29	27.73	Oct. 7	26.06	Oct. 16	27.76
May 1, 1947	29.52	Nov. 3	26.05	Dec. 9	27.64
July 15	29.40	Dec. 9	26.49		

B3-56-15dd

Date	Water level	Date	Water level	Date	Water level
Mar. 30, 1948	12.02	Jan. 19, 1949	12.56	Oct. 11, 1949	12.01
May 14	11.70	Feb. 7	12.84	Dec. 5	11.74
June 2	12.42	Mar. 8	12.45	Feb. 6, 1950	12.10
July 2	12.36	Apr. 11	11.72	Apr. 6	12.07
Aug. 2	12.98	May 3	11.46	May 31	11.35
Sept. 1	14.34	May 30	11.05	Aug. 7	13.64
Oct. 7	13.19	July 4	10.63	Oct. 16	12.74
Nov. 2	12.46	Aug. 4	11.87	Dec. 4	12.35
Dec. 8	12.67				

B3-56-24bb

Date	Water level	Date	Water level	Date	Water level
Sept. 28, 1928	7.6	May 18, 1930	6.3	Apr. 26, 1933	5.8
Apr. 29, 1929	5.6	July 31	7.7	Oct. 11	7.10
Aug. 6	7.5	Oct. 24	6.7	Apr. 24, 1934	6.47
Oct. 16	7.0	Nov. 15, 1932	6.7	Oct. 1	7.10

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-24bb—Continued

Date	Water level	Date	Water level	Date	Water level
Mar. 28, 1935	6.63	Oct. 24, 1944	7.11	Oct. 7, 1948	7.56
Oct. 25	7.08	May 1, 1945	6.29	Nov. 3	6.17
Apr. 22, 1936	6.36	Nov. 1	5.40	Dec. 8	5.82
Nov. 12	7.35	Apr. 25, 1946	5.32	Jan. 19, 1949	5.83
Apr. 29, 1937	7.10	Oct. 29	5.72	Feb. 7	5.91
Oct. 29	6.38	May 1, 1947	4.72	Mar. 8	5.05
May 3, 1938	6.20	July 18	7.00	Apr. 11	4.90
Dec. 9	6.60	Oct. 2	6.05	May 3	5.10
Apr. 26, 1939	6.40	Nov. 3	5.65	May 30	5.00
Oct. 26	7.48	Dec. 9	5.40	July 4	4.60
Apr. 24, 1940	6.98	Dec. 31	5.40	Aug. 4	5.80
Nov. 28	6.68	Feb. 3, 1948	5.30	Oct. 11	5.40
May 6, 1941	6.30	Mar. 8	5.08	Dec. 5	4.50
Nov. 5	6.34	Apr. 14	5.40	Feb. 6, 1950	4.60
Apr. 17, 1942	6.09	May 14	5.40	Apr. 6	4.70
Nov. 20	6.22	June 2	5.90	May 31	4.90
May 2, 1943	6.43	July 7	5.77	Aug. 7	7.86
Nov. 19	6.62	Aug. 2	6.82	Oct. 16	7.00
May 4, 1944	5.6	Sept. 1	7.40	Dec. 4	6.05

B3-57-6dc

[Weekly data based on daily record of automatic recorder published in Geological Survey Water-Supply Papers 1027 and 1075 and subsequent Colorado water-level reports]

Date	Water level	Date	Water level	Date	Water level
Nov. 7, 1940	47.71	June 26, 1941	47.00	Feb. 12, 1942	45.65
Nov. 14	47.55	July 3	46.94	Feb. 19	45.71
Nov. 21	47.40	July 10	46.87	Feb. 26	45.79
Nov. 28	47.28	July 17	46.81	Mar. 5	45.83
Dec. 6	47.12	July 24	46.78	Mar. 12	45.91
Dec. 13	47.07	July 31	46.71	Mar. 19	45.97
Dec. 20	47.03	Aug. 7,	46.80	Mar. 26	46.03
Dec. 27	47.00	Aug. 14	46.95	Apr. 3	46.08
Jan. 3, 1941	47.00	Aug. 21	47.03	Apr. 10	46.16
Jan. 10	47.00	Aug. 28	46.97	Apr. 17	46.25
Jan. 17	46.98	Sept. 4	46.94	Apr. 24	46.33
Jan. 24	47.00	Sept. 11	46.84	May 1	46.40
Jan. 31	47.04	Sept. 18	46.81	May 8	46.43
Feb. 7	47.10	Sept. 25	46.75	May 15	46.49
Feb. 14	47.16	Oct. 2	46.65	May 22	46.56
Feb. 21	47.23	Oct. 9	46.55	May 29	46.63
Feb. 28	47.29	Oct. 16	46.49	June 5	46.45
Mar. 7	47.35	Oct. 23	46.41	June 12	46.25
Mar. 14	47.41	Oct. 30	46.25	June 19	46.15
Mar. 21	47.50	Nov. 6	46.07	June 26	46.03
Mar. 28	47.55	Nov. 13	45.88	July 3	45.98
Apr. 4	47.62	Nov. 20	45.74	July 10	45.94
Apr. 11	47.70	Nov. 27	45.62	July 17	45.82
Apr. 18	47.70	Dec. 4	45.52	July 24	45.65
Apr. 25	47.63	Dec. 11	45.46	July 31	45.46
May 2	47.54	Dec. 18	45.43	Aug. 7	45.31
May 9	47.46	Dec. 25	45.39	Aug. 14	45.14
May 16	47.38	Jan. 1, 1942	45.36	Aug. 21	44.82
May 23	47.26	Jan. 8	45.41	Aug. 28	44.62
May 30	47.20	Jan. 15	45.43	Sept. 4	44.41
June 5	47.14	Jan. 22	45.49	Sept. 11	44.17
June 12	47.00	Jan. 29	45.52	Sept. 18	44.05
June 19	46.96	Feb. 5	45.59	Sept. 25	43.92

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-57-6dc—Continued

Date	Water level	Date	Water level	Date	Water level
Oct. 2, 1942	43.78	Dec. 1, 1943	41.79	May 26, 1945	44.40
Oct. 9	43.70	Dec. 8	41.76	June 2	44.26
Oct. 16	43.57	Dec. 15	41.73	June 9	44.18
Oct. 23	43.34	Dec. 22	41.71	June 16	44.08
Oct. 30	43.12	Dec. 29	41.72	June 23	44.12
Nov. 6	42.92	Jan. 5, 1944	41.81	June 30	44.12
Nov. 13	42.76	Jan. 12	41.93	July 7	44.22
Nov. 20	42.62	Jan. 19	42.00	July 14	44.30
Nov. 27	42.52	Jan. 26	42.10	July 21	44.39
Dec. 4	42.47	Feb. 2	42.22	July 28	44.39
Dec. 11	42.42	Feb. 9	42.31	Aug. 4	44.34
Dec. 18	42.42	Feb. 16	42.45	Aug. 11	44.10
Dec. 25	42.38	Feb. 23	42.55	Aug. 18	44.09
Jan. 1, 1943	42.39	Mar. 1	42.69	Aug. 25	43.98
Jan. 8	42.45	Mar. 8	42.80	Sept. 1	43.90
Jan. 15	42.44	Mar. 15	42.92	Sept. 8	43.84
Jan. 22	42.60	Mar. 22	43.04	Sept. 15	43.70
Jan. 29	42.67	Mar. 29	43.14	Sept. 22	43.54
Feb. 5	42.72	Apr. 5	43.24	Sept. 29	43.39
Feb. 12	42.84	Apr. 12	43.39	Oct. 6	43.17
Feb. 19	42.92	Apr. 29	43.65	Oct. 13	43.07
Feb. 26	43.03	May 6	43.75	Oct. 20	42.93
Mar. 5	43.12	May 13	43.91	Oct. 26	42.82
Mar. 12	43.22	May 20	44.10	Nov. 2	42.68
Mar. 19	43.33	May 27	44.16	Nov. 9	42.57
Mar. 26	43.42	June 3	44.01	Nov. 16	42.47
Apr. 2	43.56	June 10	43.91	Nov. 22	42.41
Apr. 9	43.68	June 17	43.89	Nov. 29	42.34
Apr. 16	43.77	June 24	43.88	Dec. 5	42.30
Apr. 23	43.94	July 1	43.81	Dec. 11	42.31
Apr. 30	44.10	July 8	43.71	Apr. 25, 1946	44.03
May 7	44.20	July 17	43.59	May 14	[9]44.4
May 14	44.12	July 24	43.44	May 21	44.4
May 21	44.02	Aug. 1	43.31	May 28	44.4
May 28	44.02	Aug. 16	43.40	June 4	44.3
June 4	44.02	Aug. 23	43.50	June 11	44.4
June 11	44.02	Aug. 30	43.57	June 18	44.5
June 18	43.91	Sept. 6	43.70	June 25	44.6
June 25	43.94	Sept. 13	43.79	July 2	44.7
July 2	43.86	Sept. 20	43.86	July 9	44.8
July 9	43.65	Sept. 27	43.93	July 16	44.7
July 16	43.45	Oct. 4	43.74	July 23	45.0
July 23	43.34	Oct. 11	43.63	July 30	45.1
July 30	43.18	Oct. 18	43.48	Aug. 6	45.40
Aug. 6	43.06	Oct. 25	43.34	Aug. 13	45.63
Aug. 13	43.05	Nov. 1	43.21	Aug. 20	45.69
Aug. 20	43.03	Nov. 8	43.06	Aug. 27	45.82
Aug. 27	43.09	Nov. 15	42.90	Sept. 3	45.75
Sept. 3	43.17	Nov. 22	42.72	Sept. 10	45.65
Sept. 10	43.22	Dec. 7	42.47	Sept. 17	45.55
Sept. 17	43.25	Dec. 14	42.43	Sept. 24	45.47
Sept. 24	43.25	Jan. 6, 1945	42.45	Oct. 1	45.42
Oct. 1	43.28	Jan. 13	42.52	Oct. 8	45.34
Oct. 8	43.20	Apr. 7	43.71	Oct. 15	45.21
Oct. 20	42.92	Apr. 14	43.85	Oct. 22	45.10
Oct. 27	42.72	Apr. 21	43.97	Oct. 29	45.00
Nov. 3	42.48	Apr. 28	44.06	Nov. 5	44.90
Nov. 10	42.27	May 5	44.19	Nov. 12	44.85
Nov. 17	42.07	May 12	44.30	Nov. 19	44.82
Nov. 24	41.90	May 19	44.39	Nov. 26	44.81

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-57-6dc—Continued

Date	Water level	Date	Water level	Date	Water level
Dec. 3, 1946	44.80	Mar. 15, 1948	44.18	July 15, 1949	45.78
Dec. 10	44.80	Mar. 22	44.24	July 22	45.75
Dec. 17	44.82	Mar. 29	44.33	July 29	45.76
Dec. 24	44.82	Apr. 5	44.44	Aug. 5	45.65
Dec. 31	44.86	Apr. 12	44.59	Aug. 12	45.71
Jan. 13, 1947	44.85	Apr. 21	44.80	Aug. 19	45.80
Jan. 20	44.90	Apr. 28	44.90	Aug. 26	45.80
Jan. 27	44.90	May 5	44.99	Sept. 1	45.65
Feb. 3	44.96	June 10	45.12	Sept. 8	45.41
Feb. 10	45.00	June 17	45.20	Sept. 15	45.23
Feb. 17	45.06	June 24	45.00	Sept. 22	45.19
Feb. 24	45.12	July 1	44.92	Sept. 29	45.08
Mar. 3	45.18	July 8	45.06	Oct. 6	44.88
Mar. 10	45.26	July 15	45.24	Oct. 13	44.69
Mar. 17	45.32	July 22	45.25	Oct. 20	44.51
Mar. 25	45.43	July 29	45.34	Oct. 27	44.31
Apr. 1	45.53	Aug. 5	45.44	Nov. 3	44.13
Apr. 8	45.63	Aug. 12	45.40	Nov. 10	43.98
Apr. 15	45.72	Aug. 19	45.55	Nov. 17	43.82
Apr. 22	45.83	Aug. 26	45.64	Nov. 24	43.61
Apr. 29	45.91	Sept. 2	45.70	Dec. 1	43.54
May 6	46.08	Sept. 9	45.72	Dec. 8	43.42
May 13	46.11	Sept. 16	45.88	Dec. 15	43.37
May 20	45.97	Sept. 23	45.90	Dec. 22	43.35
May 27	45.92	Sept. 30	45.90	Dec. 29	43.35
June 23	45.80	Oct. 7	45.70	Jan. 5, 1950	43.40
June 30	45.90	Oct. 14	45.61	Jan. 12	43.44
July 7	45.90	Oct. 21	45.50	Jan. 19	43.52
July 14	45.80	Oct. 28	45.35	Jan. 26	43.59
July 21	45.66	Nov. 4	45.21	Feb. 2	43.68
July 28	45.42	Nov. 11	45.10	Feb. 9	43.77
Aug. 4	45.43	Nov. 24	44.93	Feb. 16	43.85
Aug. 11	45.54	Dec. 1	44.90	Feb. 23	43.93
Aug. 25	45.55	Dec. 8	44.90	Mar. 2	44.05
Sept. 6	45.34	Dec. 15	44.90	Mar. 9	44.14
Sept. 13	45.13	Dec. 22	44.91	Mar. 16	44.20
Sept. 20	44.99	Dec. 29	44.95	Mar. 23	44.33
Sept. 27	44.83	Jan. 5, 1949	45.01	Mar. 30	44.44
Oct. 6	44.58	Jan. 12	45.09	Apr. 6	44.57
Oct. 13	44.41	Jan. 19	45.12	Apr. 13	44.77
Oct. 20	44.24	Jan. 26	45.22	Apr. 20	44.89
Oct. 30	44.12	Feb. 2	45.27	Apr. 27	45.10
Nov. 6	43.91	Feb. 9	45.34	May 4	45.19
Nov. 13	43.74	Feb. 16	45.41	May 11	45.05
Nov. 20	43.60	Feb. 23	45.48	May 18	45.19
Nov. 27	43.53	Mar. 2	45.53	May 25	45.27
Dec. 4	43.44	Mar. 9	45.61	June 1	45.22
Dec. 11	43.43	Mar. 16	45.68	June 8	45.47
Dec. 18	43.41	Mar. 23	45.75	June 15	45.70
Dec. 25	43.45	Mar. 30	45.80	June 22	45.51
Jan. 1, 1948	43.45	Apr. 6	45.86	June 29	45.63
Jan. 8	43.51	Apr. 13	45.95	July 6	45.55
Jan. 15	43.53	Apr. 20	46.09	July 13	45.75
Jan. 24	43.61	Apr. 27	46.17	July 20	46.00
Jan. 31	43.65	May 4	46.32	July 27	46.21
Feb. 7	43.71	May 11	46.22	Aug. 3	46.33
Feb. 14	43.78	May 18	46.10	Aug. 10	46.53
Feb. 21	43.88	May 29	46.14	Aug. 17	46.78
Feb. 28	43.96	June 5	46.14	Aug. 24	47.00
Mar. 7	43.06	July 8	46.04	Aug. 31	47.15

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-57-6dc—Continued

Date	Water level	Date	Water level	Date	Water level
Sept. 7, 1950	47.51	Oct. 18, 1950	47.13	Nov. 22, 1950	45.99
Sept. 14	47.48	Oct. 25	46.94	Nov. 29	45.83
Sept. 21	47.54	Nov. 1	46.74	Dec. 26	45.60
Sept. 28	47.46	Nov. 8	46.40	Dec. 31	45.66
Oct. 5	47.27	Nov. 15	46.13		

B3-57-7cc

Date	Water level	Date	Water level	Date	Water level
Oct. 26, 1939	48.52	July 8, 1947	47.50	Nov. 3, 1948	49.09
Nov. 26, 1940	51.28	Aug. 18	49.26	Dec. 2	47.12
May 7, 1941	50.75	Oct. 1	47.97	Jan. 13, 1949	47.02
Nov. 6	51.10	Nov. 3	46.72	Feb. 11	45.60
Apr. 17, 1942	49.10	Dec. 2	46.42	Mar. 15	47.52
Nov. 19	44.15	Jan. 5, 1948	45.80	Apr. 13	48.85
Apr. 2, 1943	46.03	Feb. 5	46.15	May 2	48.08
Nov. 19	44.55	Mar. 3	46.40	July 12	50.95
May 4, 1944	46.20	Apr. 15	46.75	Aug. 3	53.58
Oct. 23	45.80	May 17	47.60	Oct. 24	46.47
May 2, 1945	46.33	June 1	46.98	Dec. 12	45.85
Nov. 2	44.87	July 2	47.14	Feb. 2, 1950	45.94
Apr. 24, 1946	47.04	Aug. 9	48.27	Apr. 7	46.52
Oct. 28	48.25	Sept. 9	48.75	Oct. 16	50.75
May 8, 1947	48.60	Oct. 1	48.39	Dec. 14	51.35

B3-57-16aa

Date	Water level	Date	Water level	Date	Water level
June 16, 1947	40.00	Aug. 25, 1947	[d]37.99		

B3-57-19bb

[Weekly measurements in servicing automatic recorder]

Date	Water level	Date	Water level	Date	Water level
May 20, 1947	40.50	Nov. 12, 1947	37.15	Apr. 28, 1948	38.29
June 4	40.10	Nov. 19	37.06	May 5	38.29
June 11	40.12	Nov. 26	37.10	May 12	[r]45.71
June 18	40.04	Dec. 3	37.04	May 21	39.80
June 25	39.87	Dec. 10	37.09	May 28	38.60
July 2	39.79	Dec. 17	37.03	June 2	39.00
July 9	40.60	Dec. 24	37.19	June 9	38.50
July 16	[r]49.49	Dec. 31	37.13	June 16	38.32
July 23	40.38	Jan. 7, 1948	37.15	June 23	38.22
July 30	41.25	Jan. 14	37.13	June 30	37.91
Aug. 6	41.66	Jan. 21	37.18	July 7	38.74
Aug. 13	43.02	Jan. 28	37.19	July 15	[r]46.34
Aug. 20	[r]48.50	Feb. 4	37.46	July 21	40.34
Aug. 27	42.31	Feb. 11	37.53	July 28	42.36
Sept. 3	[r]48.34	Feb. 18	37.46	Aug. 4	[r]48.34
Sept. 10	39.70	Feb. 25	37.60	Aug. 11	[r]48.43
Sept. 17	40.37	Mar. 3	37.67	Aug. 18	[r]49.71
Sept. 24	39.84	Mar. 10	37.80	Aug. 25	42.98
Oct. 1	38.56	Mar. 17	37.74	Sept. 1	[r]48.73
Oct. 8	38.07	Mar. 24	37.79	Sept. 8	40.07
Oct. 15	37.64	Mar. 31	37.94	Sept. 15	[r]47.61
Oct. 22	37.49	Apr. 7	38.06	Sept. 22	39.66
Oct. 29	37.18	Apr. 14	38.13	Sept. 29	[r]47.04
Nov. 5	37.17	Apr. 21	38.17	Oct. 6	38.77

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B3-57-19bb—Continued

Date	Water level	Date	Water level	Date	Water level
Oct. 13, 1948	38.51	July 11, 1949	39.37	Apr. 10, 1950	37.43
Oct. 20	38.29	July 18	40.24	Apr. 17	37.46
Oct. 27	38.03	July 25	[r]48.13	Apr. 24	37.50
Nov. 3	37.88	Aug. 1	[r]48.54	May 1	37.87
Nov. 10	37.87	Aug. 8	[r]48.08	May 8	37.90
Nov. 17	37.66	Aug. 15	41.58	May 15	38.29
Nov. 24	37.60	Aug. 22	39.37	May 22	[r]45.71
Dec. 1	37.71	Aug. 29	39.44	May 29	40.25
Dec. 8	37.75	Sept. 5	39.08	June 5	[r]43.49
Dec. 15	37.79	Sept. 12	38.24	June 12	[r]47.48
Dec. 22	37.79	Sept. 19	38.00	June 19	39.62
Dec. 29	37.90	Sept. 26	37.80	June 26	39.20
Jan. 5, 1949	37.84	Oct. 3	37.04	July 3	[r]53.83
Jan. 12	37.83	Oct. 10	36.75	July 10	[r]49.56
Jan. 19	37.95	Oct. 17	36.49	July 17	[r]49.69
Jan. 24	38.05	Oct. 24	36.38	July 24	43.77
Jan. 31	38.00	Oct. 31	36.25	July 31	[r]49.65
Feb. 7	37.93	Nov. 7	36.13	Aug. 7	[r]51.11
Feb. 14	38.09	Nov. 14	36.21	Aug. 14	[r]51.17
Feb. 21	38.14	Nov. 21	36.23	Aug. 21	[r]50.93
Feb. 28	38.26	Nov. 28	36.10	Aug. 28	[r]51.78
Mar. 7	38.25	Dec. 5	35.96	Sept. 4	[r]51.23
Mar. 14	38.54	Dec. 12	36.28	Sept. 11	43.01
Mar. 21	38.58	Dec. 19	36.12	Sept. 18	43.48
Mar. 28	38.67	Dec. 26	36.22	Sept. 25	43.30
Apr. 4	38.75	Jan. 2, 1950	36.16	Oct. 2	42.31
Apr. 11	38.80	Jan. 9	36.13	Oct. 9	41.87
Apr. 18	38.87	Jan. 17	36.29	Oct. 17	41.63
Apr. 25	38.90	Jan. 23	36.33	Oct. 23	41.32
May 2	39.06	Jan. 30	36.45	Oct. 30	41.27
May 9	39.18	Feb. 6	36.52	Nov. 6	40.90
May 16	39.00	Feb. 14	36.67	Nov. 13	40.68
May 23	39.09	Feb. 20	36.55	Nov. 21	40.63
May 30	40.70	Feb. 27	36.68	Nov. 27	40.52
June 6	39.70	Mar. 6	36.68	Dec. 4	40.45
June 13	39.41	Mar. 13	36.98	Dec. 11	40.44
June 20	39.36	Mar. 20	37.02	Dec. 18	40.44
June 27	40.44	Mar. 27	37.03	Dec. 25	40.34
July 4	40.30	Apr. 3	37.24	Jan. 1, 1951	40.43

B3-57-30bb

Date	Water level	Date	Water level	Date	Water level
Nov. 29, 1940	17.10	Apr. 30, 1947	14.20	Oct. 1, 1948	14.11
May 7, 1941	17.20	May 20	13.95	Nov. 9	12.89
Nov. 6	18.51	July 8	12.24	Dec. 2	12.92
Apr. 17, 1942	18.03	Oct. 1	13.10	Jan. 13, 1949	13.10
Nov. 19	12.72	Nov. 3	11.95	Feb. 11	13.39
Apr. 2, 1943	14.01	Dec. 3	12.60	Mar. 15	13.49
Nov. 18	13.70	Jan. 5, 1948	12.22	Apr. 13	13.79
May 4, 1944	15.19	Feb. 5	12.72	May 2	13.60
Oct. 23	14.68	Apr. 13	13.30	June 17	13.27
May 2, 1945	14.79	May 17	12.40	July 12	12.99
Nov. 2	10.35	June 1	11.55	Aug. 3	13.05
Apr. 24, 1946	12.19	July 2	11.54	Oct. 24	10.60
Oct. 28	14.91	Sept. 9	15.40	Dec. 16, 1950	15.86

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-58-3cb

[Data based on weekly measurements in servicing automatic recorder]

Date	Water level	Date	Water level	Date	Water level
Dec. 4, 1947	46.75	Apr. 4, 1949	47.93	Feb. 20, 1950	46.92
May 3, 1948	47.7	Apr. 11	47.89	Feb. 27	46.99
May 27	47.64	Apr. 18	47.71	Mar. 6	47.09
June 2	47.37	Apr. 25	47.99	Mar. 13	47.19
June 9	47.40	May 2	48.20	Mar. 20	47.29
June 16	47.27	May 9	48.38	Mar. 27	47.25
June 23	47.17	May 16	48.25	Apr. 3	47.41
June 30	46.97	May 23	48.30	Apr. 10	47.68
July 7	47.42	May 30	48.60	Apr. 17	47.53
July 14	47.88	June 6	48.55	Apr. 24	47.65
July 21	48.14	June 13	48.53	May 1	47.58
July 28	48.48	June 20	48.45	May 8	47.73
Aug. 4	48.50	June 27	48.53	May 15	47.72
Aug. 11	48.58	July 4	48.71	May 22	48.03
Aug. 18	48.69	July 11	48.81	May 29	48.10
Aug. 25	48.79	July 18	48.80	June 5	48.09
Sept. 1	49.03	July 25	48.99	June 12	48.51
Sept. 8	48.88	Aug. 1	49.10	June 19	48.57
Sept. 15	48.69	Aug. 8	49.11	June 26	48.66
Sept. 22	48.60	Aug. 15	49.16	July 3	49.09
Sept. 29	48.74	Aug. 22	49.12	July 10	49.20
Oct. 6	48.48	Aug. 29	49.06	July 17	49.75
Oct. 13	48.10	Sept. 5	48.75	July 24	50.11
Oct. 20	48.08	Sept. 12	48.58	July 31	50.33
Oct. 27	47.70	Sept. 19	48.25	Aug. 7	50.65
Nov. 3	47.51	Sept. 26	48.33	Aug. 14	50.89
Nov. 10	47.52	Oct. 3	48.00	Aug. 21	51.00
Nov. 17	47.33	Oct. 10	47.80	Aug. 28	51.13
Nov. 24	47.28	Oct. 17	47.42	Sept. 4	51.32
Dec. 1	47.31	Oct. 24	47.20	Sept. 11	51.24
Dec. 8	47.33	Oct. 31	47.02	Sept. 18	51.03
Dec. 15	47.26	Nov. 7	46.98	Sept. 25	50.83
Dec. 22	47.10	Nov. 14	46.98	Oct. 2	50.93
Dec. 29	47.37	Nov. 21	46.92	Oct. 9	50.60
Jan. 5, 1949	47.30	Nov. 28	46.84	Oct. 16	50.38
Jan. 12	47.23	Dec. 5	46.63	Oct. 23	50.24
Jan. 19	47.37	Dec. 12	46.89	Oct. 30	50.07
Jan. 24	47.43	Dec. 19	46.74	Nov. 6	49.99
Jan. 31	47.40	Dec. 26	46.76	Nov. 13	49.73
Feb. 7	47.38	Jan. 2, 1950	46.69	Nov. 20	49.70
Feb. 14	47.44	Jan. 9	46.60	Nov. 27	49.61
Feb. 21	47.60	Jan. 17	46.83	Dec. 4	49.56
Feb. 28	47.52	Jan. 23	46.70	Dec. 11	49.50
Mar. 7	47.56	Jan. 30	46.89	Dec. 18	49.39
Mar. 14	47.80	Feb. 6	46.93	Dec. 25	49.33
Mar. 21	47.77	Feb. 14	47.08	Jan. 1, 1951	49.28
Mar. 28	47.88				

B3-58-8cb

Date	Water level	Date	Water level	Date	Water level
Nov. 26, 1940	55.26	Oct. 23, 1944	48.43	Oct. 1, 1947	49.68
May 7, 1941	56.28	May 3, 1945	52.22	Nov. 3	48.79
Nov. 6	52.28	Nov. 2	49.25	Dec. 2	49.56
Apr. 18, 1942	55.08	Apr. 24, 1946	51.99	Jan. 6, 1948	50.14
Nov. 19	50.62	Oct. 28	51.69	Feb. 3	50.66
Apr. 1, 1943	52.77	Apr. 30, 1947	53.05	Mar. 10	51.39
Nov. 18	51.44	July 9	50.78	Apr. 12	51.90
May 5, 1944	53.36	Aug. 18	50.37	May 13	51.00

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-58-8cb—Continued

Date	Water level	Date	Water level	Date	Water level
June 1, 1948	50.36	Feb. 11, 1949	50.30	Dec. 9, 1949	48.14
July 2	49.03	Mar. 11	50.88	Feb. 2, 1950	49.35
Aug. 11	48.65	Apr. 18	51.34	Apr. 10	50.79
Sept. 8	48.15	May 2	51.51	May 24	51.43
Oct. 1	48.52	June 6	51.47	Aug. 3	50.98
Nov. 3	48.33	Aug. 3	48.30	Oct. 17	51.25
Dec. 3	48.96	Oct. 14	47.08	Dec. 9	51.49

B3-58-11bc

Date	Water level	Date	Water level	Date	Water level
Oct. 26, 1939	56.62	Apr. 30, 1947	56.21	Dec. 3, 1948	54.37
Nov. 26, 1940	58.77	Oct. 1	56.90	Jan. 13, 1949	54.09
May 7, 1941	57.95	Nov. 3	54.47	Feb. 11	54.55
Nov. 6	58.00	Dec. 2	53.76	Mar. 11	54.88
Apr. 18, 1942	56.45	Jan. 7, 1948	53.54	Apr. 18	54.74
Nov. 19	51.85	Feb. 3	53.24	June 6	55.76
Apr. 1, 1943	52.94	Mar. 3	53.70	Aug. 3	57.38
Nov. 18	53.00	Apr. 15	54.00	Oct. 10	55.84
May 4, 1944	53.51	May 13	54.65	Dec. 12	53.85
Oct. 23	54.39	June 1	54.39	Feb. 2, 1950	53.74
May 3, 1945	53.35	Aug. 11	57.42	Apr. 10	54.35
Nov. 2	52.88	Sept. 2	57.59	Oct. 16	59.69
Apr. 24, 1946	53.78	Oct. 1	57.15	Dec. 9	57.69
Oct. 28	57.29	Nov. 3	55.82		

B3-58-12cd2

Date	Water level	Date	Water level	Date	Water level
May 9, 1947	51.51	May 13, 1948	49.75	Mar. 15, 1949	49.83
May 20	51.73	June 1	49.91	Apr. 13	50.24
July 9	52.44	July 2	50.21	May 2	50.52
Aug. 18	53.34	Aug. 9	56.10	Aug. 3	53.29
Oct. 1	52.19	Sept. 9	53.09	Oct. 17	50.04
Nov. 3	50.34	Oct. 1	52.56	Dec. 12	48.63
Dec. 2	49.44	Nov. 3	50.80	Feb. 2, 1950	48.39
Jan. 5, 1948	48.94	Dec. 2	50.15	Apr. 7	48.96
Feb. 5	48.84	Jan. 13, 1949	49.58	Oct. 16	54.94
Mar. 3	49.02	Feb. 11	49.55	Dec. 14	53.14
Apr. 15	49.40				

B3-58-13cb2

Date	Water level	Date	Water level	Date	Water level
Aug. 20, 1947	55.00	Aug. 9, 1948	52.09	June 6, 1949	51.55
Oct. 1	50.10	Oct. 1	51.09	July 12	50.05
Nov. 3	48.32	Nov. 3	48.45	Oct. 17	47.17
Dec. 2	48.60	Dec. 2	47.93	Dec. 12	46.32
Jan. 5, 1948	47.37	Jan. 13, 1949	47.55	Feb. 2, 1950	45.33
Feb. 5	47.28	Feb. 11	47.49	Apr. 7	46.89
Mar. 3	47.34	Mar. 15	47.97	May 25	[s]52.16
Apr. 13	47.75	Apr. 13	48.22	Oct. 16	53.05
May 17	47.70	May 2	48.47	Dec. 14	51.55
June 1	47.72				

B3-59-10ad

Date	Water level	Date	Water level	Date	Water level
July 9, 1947	31.22	Nov. 3, 1947	25.89	Feb. 3, 1948	27.15
Aug. 18	32.25	Dec. 2	26.37	Mar. 2	27.57
Oct. 1	26.50	Jan. 6, 1948	26.86	Apr. 13	28.00

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-59-10ad—Continued

Date	Water level	Date	Water level	Date	Water level
May 13, 1948	29.10	Jan. 13, 1949	27.28	Oct. 14, 1949	25.63
June 1	30.35	Feb. 11	27.67	Dec. 9	26.25
July 14	33.08	Mar. 11	28.01	Feb. 2, 1950	27.00
Aug. 11	31.29	Apr. 14	28.18	Apr. 10	27.86
Sept. 8	29.02	May 2	29.50	May 24	32.03
Oct. 1	29.26	June 6	28.79	Aug. 3	36.45
Nov. 3	27.01	July 13	29.37	Oct. 12	29.00
Dec. 3	26.95	Aug. 3	29.61	Dec. 9	27.70

B3-60-3cc

Date	Water level	Date	Water level	Date	Water level
Oct. 29, 1937	57.42	Apr. 1, 1943	57.89	Sept. 23, 1947	66.70
May 11, 1938	55.77	Nov. 18	60.60	Oct. 13	63.52
Dec. 8	57.48	May 1, 1944	58.01	Nov. 4	63.13
Apr. 25, 1939	55.78	Oct. 23	61.77	Dec. 8	62.04
Oct. 25	59.36	May 30, 1945	58.60	Jan. 6, 1948	61.50
Nov. 6, 1940	59.71	Oct. 31	61.35	Feb. 3	60.76
Nov. 6, 1941	60.03	Oct. 28, 1946	61.90	Mar. 2	61.30
Apr. 18, 1942	58.03	Apr. 30, 1947	58.45	Apr. 15	[t]59.70
Nov. 19	59.64				

B3-60-4dc

Date	Water level	Date	Water level	Date	Water level
Sept. 9, 1948	[u]66.87	Mar. 11, 1949	63.56	Dec. 12, 1949	64.89
Oct. 4	66.65	Apr. 14	64.39	Feb. 3, 1950	64.38
Nov. 5	65.50	May 4	63.18	Apr. 5	63.29
Dec. 6	64.99	June 16	63.10	Oct. 12	67.67
Jan. 14, 1949	64.25	July 13	64.68	Dec. 9	66.08
Feb. 14	63.76	Oct. 14	66.04		

B3-60-8dc

Date	Water level	Date	Water level	Date	Water level
Apr. 17, 1947	43.19	Aug. 5, 1948	46.10	May 5, 1949	45.40
Sept. 22	43.87	Sept. 13	46.29	Oct. 18	44.73
Oct. 3	43.81	Oct. 4	44.94	Dec. 9	44.57
Jan. 9, 1948	43.83	Nov. 8	44.95	Feb. 3, 1950	44.80
Feb. 2	43.74	Dec. 6	44.60	Apr. 5	45.36
Mar. 10	43.70	Jan. 14, 1949	44.42	May 23	44.32
Apr. 12	43.60	Feb. 15	44.45	Oct. 14	45.65
June 3	43.78	Mar. 11	44.54	Dec. 9	45.65
July 1	43.94	Apr. 14	44.41		

B3-60-13cd

Date	Water level	Date	Water level	Date	Water level
Oct. 30, 1946	55.22	Apr. 13, 1948	55.20	Apr. 14, 1949	56.54
Apr. 30, 1947	54.93	June 3	56.00	May 2	56.44
Sept. 24	57.92	Sept. 8	57.31	June 6	57.11
Oct. 8	56.34	Oct. 4	56.63	Oct. 12	58.37
Nov. 4	55.74	Nov. 4	56.47	Dec. 12	57.15
Dec. 4	55.45	Dec. 6	56.50	Feb. 1, 1950	56.84
Jan. 8, 1948	55.33	Jan. 14, 1949	56.32	Apr. 11	56.83
Feb. 3	55.20	Feb. 14	56.43	Oct. 17	59.63
Mar. 3	55.28	Mar. 14	56.47	Dec. 14	58.43

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-22cc

Date	Water level	Date	Water level	Date	Water level
Nov. 11, 1936	49.6	Oct. 26, 1944	55.24	Nov. 4, 1948	57.80
Oct. 29, 1937	50.91	May 30, 1945	53.13	Dec. 6	57.06
Apr. 11, 1938	49.44	Oct. 31	55.05	Jan. 14, 1949	56.32
Dec. 9	50.65	Oct. 28, 1946	55.93	Feb. 15	56.10
Apr. 25, 1939	49.65	Apr. 30, 1947	53.79	Mar. 15	55.78
Oct. 25	52.71	Oct. 3	62.33	Apr. 14	55.54
Apr. 25, 1940	50.67	Nov. 4	56.84	May 4	56.52
Nov. 6	53.08	Dec. 4	56.14	June 6	54.59
May 7, 1941	51.32	Jan. 9, 1948	55.54	Oct. 17	59.15
Nov. 4	53.31	Feb. 3	55.24	Dec. 12	57.45
Apr. 18, 1942	51.69	Mar. 10	54.84	Feb. 1, 1950	56.44
Nov. 19	53.07	Apr. 13	54.50	Apr. 10	55.98
Apr. 1, 1943	51.94	June 3	55.54	Oct. 14	61.15
Nov. 18	54.17	Sept. 15	59.39	Dec. 9	59.08
May 1, 1944	52.45				

B3-60-32cb

Date	Water level	Date	Water level	Date	Water level
Nov. 29, 1940	40.12	Oct. 28, 1946	41.76	Jan. 15, 1949	42.85
May 7, 1941	40.23	Apr. 30, 1947	41.81	Feb. 15	42.82
Nov. 4	40.52	Nov. 4	42.44	Mar. 15	42.81
Apr. 18, 1942	40.02	Dec. 4	42.30	Apr. 15	42.82
Nov. 19	39.76	Jan. 8, 1948	42.37	June 6	42.83
Apr. 1, 1943	39.90	Feb. 2	42.27	Oct. 17	43.37
Nov. 18	40.48	Mar. 10	42.25	Dec. 12	43.27
May 1, 1944	40.47	Apr. 12	42.03	Feb. 1, 1950	43.20
Oct. 26	41.46	June 30	41.66	Apr. 10	43.26
May 30, 1945	41.15	Oct. 4	44.08	Oct. 14	44.19
Oct. 31	41.52	Nov. 4	43.42	Dec. 9	43.95
Apr. 24, 1946	41.49	Dec. 7	42.97		

B4-55-3bc

Date	Water level	Date	Water level	Date	Water level
Nov. 3, 1947	11.10	Sept. 10, 1948	11.35	Aug. 4, 1949	11.05
Dec. 9	11.24	Oct. 7	11.24	Oct. 19	11.19
Jan. 2, 1948	11.15	Nov. 1	11.15	Dec. 6	10.72
Feb. 4	10.54	Dec. 6	11.35	Feb. 7, 1950	11.15
Mar. 8	10.90	Mar. 8, 1949	11.24	Apr. 6	11.62
Apr. 14	10.78	Apr. 8	11.25	May 26	11.54
June 7	10.52	May 3	11.48	Aug. 4	12.12
July 13	11.39	June 6	11.58	Oct. 18	11.50
Aug. 6	11.41	July 8	10.29	Dec. 7	11.46

B4-55-4dc

Date	Water level	Date	Water level	Date	Water level
Oct. 5, 1928	11.48	Apr. 29, 1937	12.61	Apr. 17, 1942	11.13
Apr. 28, 1929	11.30	Oct. 29	12.93	Nov. 20	11.70
Oct. 16	11.32	May 3, 1938	12.66	Apr. 2, 1943	12.00
Nov. 15, 1932	11.41	Dec. 9	11.88	Nov. 19	11.85
May 26, 1933	11.47	Apr. 26, 1939	11.04	Oct. 24, 1944	11.83
Oct. 11	11.75	Oct. 26	12.80	May 1, 1945	11.72
Apr. 24, 1934	12.08	Apr. 24, 1940	12.31	Nov. 1	10.95
Oct. 2	13.75	Nov. 8	12.54	Apr. 25, 1946	11.24
Mar. 28, 1935	12.51	May 6, 1941	12.32	Oct. 29	11.07
Oct. 15	12.41	Nov. 5	11.91	May 1, 1947	[d]11.45
Nov. 12, 1936	12.55				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B4-55-6cb2

Date	Water level	Date	Water level	Date	Water level
Nov. 3, 1947	27.34	July 13, 1948	27.41	Apr. 11, 1949	28.59
Dec. 9	27.74	Sept. 10	26.99	Apr. 30	28.63
Dec. 30	28.08	Oct. 7	27.24	May 31	28.27
Feb. 3, 1948	28.14	Nov. 2	28.66	July 8	28.10
Mar. 8	28.22	Dec. 6	27.95	Aug. 4	26.86
Apr. 14	28.25	Feb. 8, 1949	28.32	Oct. 19	26.72
May 14	27.50	Mar. 8	28.48	Dec. 6	[a]27.59
June 7	27.78				

B4-55-9dc

Date	Water level	Date	Water level	Date	Water level
Aug. 23, 1930	15.13	Nov. 5, 1941	18.12	Apr. 14, 1948	16.70
Nov. 15, 1932	16.38	Apr. 17, 1942	17.23	June 7	15.36
May 26, 1933	16.64	Nov. 20	16.15	Aug. 6	16.04
Oct. 11	15.90	Apr. 2, 1943	17.24	Sept. 10	16.52
Apr. 24, 1934	16.64	Nov. 19	16.40	Oct. 7	16.91
Oct. 2	18.26	May 4, 1944	17.50	Nov. 1	16.23
Mar. 28, 1935	17.85	Oct. 24	16.47	Dec. 8	16.35
Oct. 15	16.47	May 1, 1945	17.44	Mar. 8, 1949	16.84
Apr. 22, 1936	17.06	Nov. 1	15.40	Apr. 8	16.92
Sept. 10	19.10	Apr. 25, 1946	16.23	May 3	16.89
Nov. 10	17.70	Oct. 29	16.60	June 6	17.27
Apr. 29, 1937	17.85	May 1, 1947	17.37	Aug. 4	16.14
Oct. 29	19.00	July 11	15.80	Oct. 19	14.75
May 3, 1938	18.14	Aug. 28	15.30	Dec. 1	15.69
Dec. 9	16.77	Oct. 6	15.15	Feb. 7, 1950	16.47
Apr. 26, 1939	17.07	Nov. 3	15.35	Apr. 6	16.69
Oct. 26	19.10	Dec. 9	15.81	May 26	17.82
Apr. 24, 1940	17.67	Jan. 2, 1948	15.97	Oct. 18	16.86
Nov. 28	19.22	Feb. 4	16.25	Dec. 7	16.62
May 6, 1941	18.88	Mar. 8	16.43		

B4-55-16cc

Date	Water level	Date	Water level	Date	Water level
July 11, 1947	18.50	June 7, 1948	18.71	June 6, 1949	20.13
Sept. 12	17.83	Aug. 6	[v]33.64	Oct. 19	17.57
Oct. 6	17.53	Oct. 7	18.87	Dec. 1	18.21
Nov. 3	17.88	Nov. 1	18.87	Feb. 7, 1950	19.02
Dec. 9	18.59	Dec. 7	18.84	Apr. 6	18.54
Jan. 2, 1948	18.97	Jan. 19, 1949	19.37	May 26	20.13
Feb. 4	19.14	Feb. 8	18.79	Oct. 18	19.65
Mar. 8	19.64	Mar. 8	19.11	Dec. 7	19.49
Apr. 14	19.54	Apr. 8	19.64		

B4-55-18cc

Date	Water level	Date	Water level	Date	Water level
Apr. 26, 1939	20.23	Nov. 1, 1945	19.24	Apr. 14, 1948	19.90
Oct. 26	21.42	Apr. 25, 1946	20.41	May 14	19.70
Nov. 8, 1940	21.75	Oct. 29	20.17	June 7	19.19
May 6, 1941	21.78	May 1, 1947	21.00	Aug. 6	19.14
Nov. 5	20.65	July 14	19.60	Sept. 10	19.12
Apr. 17, 1942	20.71	Aug. 28	19.40	Oct. 7	19.98
Nov. 20	19.10	Oct. 6	18.49	Nov. 1	18.55
Apr. 2, 1943	20.25	Nov. 3	17.95	Dec. 8	19.06
Nov. 19	19.48	Dec. 9	18.62	Jan. 19, 1949	19.42
May 4, 1944	20.48	Jan. 2, 1948	19.15	Feb. 8	19.49
Oct 24	19.51	Feb. 3	19.48	Mar. 8	19.70
May 1, 1945	20.69	Mar. 8	19.70	Apr. 11	19.92

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-55-18cc—Continued

Date	Water level	Date	Water level	Date	Water level
May 3, 1949	21.00	Oct. 19, 1949	17.53	Apr. 6, 1950	19.85
May 31	20.17	Dec. 6	18.79	Aug. 4	19.88
Aug. 4	19.19	Feb. 6, 1950	19.54	Oct. 18	20.05

B4-56-23dc

Date	Water level	Date	Water level	Date	Water level
May 26, 1933	19.66	May 1, 1947	20.35	Dec. 8, 1948	19.00
Oct. 11	17.93	June 30	19.80	Jan. 19, 1949	19.49
Apr. 24, 1934	19.44	Aug. 28	18.40	Feb. 8	19.64
Oct. 2	19.66	Oct. 6	17.99	Mar. 8	19.83
Mar. 28, 1935	19.85	Nov. 3	18.29	Apr. 11	19.95
Oct. 15	18.46	Dec. 9	18.86	May 3	19.65
May 6, 1941	20.87	Jan. 2, 1948	19.25	May 31	19.33
Nov. 5	20.33	Feb. 3	19.62	July 8	18.27
Apr. 17, 1942	21.01	Mar. 8	19.92	Aug. 4	18.40
Nov. 20	18.83	Apr. 14	20.10	Oct. 19	17.14
Apr. 2, 1943	20.21	May 14	19.30	Dec. 6	18.29
Nov. 19	18.62	June 7	18.83	Feb. 6, 1950	18.33
May 2, 1944	20.48	July 13	18.80	Apr. 6	19.84
Oct. 24	18.75	Aug. 6	18.63	May 26	20.32
May 1, 1945	20.64	Sept. 10	18.36	Aug. 4	19.39
Nov. 1	18.38	Oct. 7	18.22	Oct. 18	18.44
Apr. 25, 1946	20.57	Nov. 2	18.40	Dec. 7	19.04
Oct. 29	19.50				

B4-57-19db

Date	Water level	Date	Water level	Date	Water level
Sept. 9, 1947	47.55	July 6, 1948	48.21	June 14, 1949	47.20
Oct. 13	47.50	Aug. 9	48.02	July 13	45.60
Nov. 3	49.80	Sept. 9	44.55	Aug. 3	46.18
Dec. 2	44.72	Oct. 1	47.86	Oct. 20	43.33
Jan. 5, 1948	51.31	Nov. 5	40.30	Dec. 15	43.52
Feb. 4	45.89	Dec. 2	41.34	Feb. 2, 1950	44.90
Mar. 2	46.65	Mar. 15, 1949	45.26	Apr. 7	46.92
Apr. 15	47.80	Apr. 6	45.93	May 25	47.86
May 13	48.20	May 3	46.83	Aug. 3	49.96
June 1	49.37				

B4-57-28bd

Date	Water level	Date	Water level	Date	Water level
May 31, 1947	27.98	Aug. 9, 1948	25.22	July 13, 1949	25.91
July 11	26.02	Sept. 9	25.38	Aug. 3	25.34
Aug. 18	24.53	Oct. 1	25.55	Oct. 20	23.62
Oct. 1	23.92	Nov. 5	25.95	Dec. 15	24.57
Nov. 3	24.15	Dec. 2	26.35	Feb. 2, 1950	25.00
Dec. 2	24.70	Jan. 13, 1949	26.80	Apr. 7	26.94
Jan. 5, 1948	25.45	Feb. 8	27.06	May 24	27.61
Feb. 4	26.04	Mar. 15	27.45	Aug. 2	27.22
Mar. 2	26.36	Apr. 6	27.74	Oct. 16	29.60
May 13	26.61	May 3	27.97	Dec. 16	28.91
June 1	26.21	June 14	27.31		

B4-57-31db1

Date	Water level	Date	Water level	Date	Water level
July 11, 1947	[w]8.14	Nov. 3, 1947	15.54	Feb. 4, 1948	8.30
Aug. 18	[w]18.01	Dec. 2	15.80	Mar. 2	7.00
Oct. 1	15.08	Jan. 5, 1948	16.53	Apr. 15	16.50

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

Date	Water level	Date	Water level	Date	Water level
MORGAN COUNTY, COLO.—Continued					
B4-57-31db1—Continued					
May 13, 1948	7.50	Nov. 5, 1948	8.95	May 3, 1949	6.95
June 1	7.47	Dec. 2	9.30	June 14	5.02
July 6	9.23	Jan. 13, 1949	13.50	July 13	8.96
Aug. 9	9.20	Feb. 8	13.48	Oct. 20	9.99
Sept. 9	9.95	Mar. 16	12.80	Feb. 2, 1950	10.35
Oct. 1	10.19	Apr. 6	10.15		
B4-58-7ca					
Sept. 10, 1947	17.00	Nov. 3, 1947	[x]20.76	Jan. 5, 1948	[x]24.90
Oct. 13	[x]18.90	Dec. 6	[x]23.56	Feb. 4	[xy]26.99
B4-58-7cb					
Mar. 2, 1948	[z]6.16	Jan. 13, 1949	6.17	Oct. 14, 1949	5.75
May 13	6.50	Feb. 11	6.22	Dec. 8	5.87
June 3	7.08	Mar. 11	6.15	Feb. 2, 1950	6.23
July 6	6.07	Apr. 6	6.07	Apr. 10	7.05
Aug. 11	5.29	May 4	6.39	May 24	8.48
Sept. 9	5.38	June 14	5.65	Aug. 3	5.18
Oct. 1	5.22	July 13	4.69	Oct. 17	5.59
Nov. 5	5.61	Aug. 2	4.75	Dec. 15	5.82
Dec. 3	5.93				
B4-58-18aa[aa]					
July 13, 1949	Dry	Oct. 14, 1949	Dry	Oct. 17, 1950	Dry
B4-58-18dc[aa]					
June 3, 1949	40.50	Dec. 8, 1949	39.78	Aug. 1, 1950	40.56
July 13	39.86	Feb. 2, 1950	40.35	Oct. 12	41.20
Aug. 2	39.69	Apr. 11	40.79	Dec. 15	40.90
Oct. 12	39.23	May 24	40.53		
B4-58-19bc[aa]					
June 13, 1949	49.50	Feb. 2, 1950	47.79	Oct. 12, 1950	50.66
Oct. 12	47.52	Apr. 11	47.49	Dec. 15	49.22
Dec. 8	47.48				
B4-58-22ba					
Sept. 9, 1947	15.30	Aug. 9, 1948	15.16	July 13, 1949	15.43
Oct. 13	15.58	Sept. 10	15.18	Aug. 3	15.55
Nov. 3	15.48	Oct. 1	15.15	Oct. 20	15.63
Dec. 2	15.39	Nov. 5	15.08	Dec. 15	15.15
Jan. 5, 1948	15.30	Dec. 2	15.11	Feb. 2, 1950	15.45
Feb. 4	15.20	Feb. 8, 1949	15.10	Apr. 7	15.78
Mar. 2	14.90	Mar. 15	15.15	May 24	15.21
May 13	15.10	Apr. 6	15.23	Aug. 2	16.12
June 1	15.09	May 3	15.21	Oct. 16	16.45
July 6	15.16	June 14	15.23	Dec. 15	16.57

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-58-29ad

Date	Water level	Date	Water level	Date	Water level
Mar. 8, 1949	[bb]35.45	Aug. 2, 1949	32.16	May 24, 1950	32.80
Apr. 18	34.79	Oct. 10	32.09	Aug. 1	33.05
May 4	33.41	Dec. 8	34.40	Oct. 12	33.88
June 17	32.42	Feb. 2, 1950	34.98	Dec. 15	34.25
July 13	32.08	Apr. 11	34.49		

B4-58-32bb

Date	Water level	Date	Water level	Date	Water level
Sept. 30, 1947	65.80	Aug. 11, 1948	62.94	July 13, 1949	63.58
Nov. 3	61.00	Sept. 8	62.35	Oct. 12	61.46
Dec. 10	60.84	Oct. 1	61.78	Dec. 8	61.38
Jan. 6, 1948	61.30	Nov. 3	61.06	Feb. 2, 1950	61.94
Feb. 3	62.98	Dec. 3	61.05	Apr. 11	62.61
Mar. 2	62.19	Feb. 11, 1949	61.74	May 24	63.97
Apr. 15	62.57	Mar. 11	62.25	Aug. 1	66.10
May 13	62.30	Apr. 18	62.42	Oct. 12	67.10
June 1	61.37	May 4	62.64	Dec. 9	63.43
July 6	61.98	June 17	62.73		

B4-59-31bc

Date	Water level	Date	Water level	Date	Water level
July 10, 1947	73.95	June 3, 1948	74.76	Apr. 6, 1949	75.39
Sept. 29	76.80	July 7	74.86	May 4	75.33
Nov. 4	76.17	Sept. 8	77.73	June 16	75.15
Dec. 8	75.47	Oct. 4	77.41	Oct. 14	77.33
Jan. 5, 1948	76.22	Nov. 5	76.78	Dec. 12	76.65
Feb. 3	74.97	Dec. 6	76.39	Feb. 3, 1950	76.09
Mar. 2	74.40	Jan. 14, 1949	75.95	Apr. 11	75.64
Apr. 15	74.40	Feb. 14	75.71	May 24	75.76
May 13	74.45	Mar. 11	75.72	Dec. 9	78.64

B4-59-36cc

Date	Water level	Date	Water level	Date	Water level
Sept. 29, 1947	66.10	June 1, 1948	65.59	Mar. 11, 1949	65.89
Nov. 3	64.94	July 6	65.91	Apr. 18	66.03
Dec. 4	65.20	Aug. 11	66.63	June 17	65.85
Jan. 6, 1948	65.43	Oct. 1	65.59	Dec. 8	65.00
Feb. 3	65.42	Nov. 3	65.31	Feb. 2, 1950	65.69
Mar. 2	65.83	Dec. 3	65.11	Apr. 11	67.50
Apr. 15	65.77	Jan. 13, 1949	65.34	Dec. 9	67.15
May 13	66.55	Feb. 11	65.61		

B4-60-2aa

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1947	7.50	Aug. 12, 1948	7.77	July 13, 1949	6.50
Oct. 9	7.18	Sept. 9	7.91	Aug. 1	7.50
Nov. 3	7.77	Oct. 1	7.69	Oct. 14	8.09
Dec. 6	8.33	Nov. 5	8.39	Dec. 8	8.72
Jan. 5, 1948	8.44	Dec. 6	8.84	Feb. 3, 1950	9.23
Feb. 4	8.45	Feb. 11, 1949	9.09	Apr. 10	9.42
Mar. 2	8.15	Mar. 11	9.20	May 24	8.76
Apr. 15	8.52	Apr. 6	8.98	Aug. 3	7.87
May 13	7.90	May 4	9.02	Oct. 17	8.52
June 3	7.76	June 14	5.89	Dec. 15	9.18
July 7	8.01				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B4-60-5cd

Date	Water level	Date	Water level	Date	Water level
Oct. 9, 1947	3.22	Aug. 11, 1948	2.07	May 4, 1949	2.93
Nov. 3	3.90	Sept. 9	2.75	June 14	1.23
Dec. 6	4.37	Oct. 1	3.21	July 13	2.24
Jan. 6, 1948	4.72	Nov. 5	3.14	Aug. 1	2.20
Feb. 4	5.00	Dec. 6	3.90	Oct. 14	3.23
Mar. 2	4.68	Jan. 13, 1949	4.00	Dec. 8	2.15
Apr. 15	4.00	Feb. 11	3.59	Feb. 3, 1950	4.00
June 3	2.72	Mar. 11	2.85	Apr. 10	[d]4.20
July 7	2.74	Apr. 6	2.70		

B4-60-6cc

Date	Water level	Date	Water level	Date	Water level
Apr. 11, 1948	41.82	Mar. 11, 1949	41.82	Dec. 8, 1949	42.18
Nov. 5	43.74	Apr. 6	41.58	Feb. 3, 1950	42.15
Dec. 6	44.86	Aug. 1	42.89	Apr. 10	43.34
Feb. 11, 1949	42.84	Oct. 14	42.02	Dec. 15	43.24

B4-60-9ab

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1947	8.70	Sept. 9, 1948	7.39	July 13, 1949	7.89
Oct. 9	9.65	Oct. 1	9.35	Aug. 1	7.30
Nov. 3	9.94	Nov. 5	9.84	Oct. 14	7.94
Dec. 6	10.20	Dec. 6	10.32	Dec. 8	8.10
Jan. 6, 1948	10.36	Jan. 13, 1949	10.34	Feb. 3, 1950	10.76
Feb. 4	10.60	Feb. 11	10.74	Apr. 10	11.09
Mar. 2	10.52	Mar. 11	10.60	May 24	8.85
Apr. 15	11.70	Apr. 6	9.91	Aug. 3	8.20
June 3	7.30	May 4	10.05	Oct. 17	10.12
July 7	6.63	June 14	7.86	Dec. 15	10.99
Aug. 11	7.73				

B4-60-12cc

Date	Water level	Date	Water level	Date	Water level
Oct. 3, 1947	68.80	July 7, 1948	69.67	Mar. 11, 1949	69.97
Nov. 4	67.91	Aug. 11	70.63	Apr. 6	69.29
Dec. 8	68.19	Sept. 8	69.43	May 4	70.61
Jan. 5, 1948	68.49	Oct. 4	68.77	June 16	70.28
Feb. 4	68.78	Nov. 5	68.59	Dec. 12	70.22
Mar. 2	69.02	Dec. 6	68.69	Feb. 3, 1950	69.49
Apr. 15	69.50	Jan. 13, 1949	69.16	Apr. 11	69.82
May 13	69.60	Feb. 14	69.50	Dec. 9	70.71
June 3	70.10				

B4-60-23cd

Date	Water level	Date	Water level	Date	Water level
Oct. 3, 1947	78.64	Nov. 5, 1948	77.12	Oct. 14, 1949	79.76
Nov. 4	75.77	Dec. 6	75.57	Dec. 12	75.69
Dec. 8	74.69	Jan. 14, 1949	74.75	Feb. 3, 1950	74.67
Jan. 6, 1948	73.56	Feb. 14	74.29	Apr. 11	74.22
Feb. 4	73.92	Mar. 11	74.41	Aug. 1	85.59
Mar. 2	73.61	Apr. 6	74.19	Oct. 12	81.90
Apr. 15	72.65	June 16	75.26	Dec. 9	77.95
Aug. 11	[cc]93.30				

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-60-32ad

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1947	48.80	Sept. 9, 1948	49.45	July 4, 1949	49.32
Oct. 13	48.43	Oct. 4	49.91	Aug. 1	50.97
Nov. 4	49.78	Dec. 6	[dd]50.90	Oct. 14	51.09
Jan. 6, 1948	47.50	Feb. 15, 1949	50.78	Dec. 12	50.35
Feb. 3	46.70	Mar. 11	49.99	Feb. 3, 1950	50.48
Mar. 10	48.50	Apr. 14	50.00	Apr. 5	49.65
June 3	49.38	May 2	49.34	May 24	50.53
July 7	49.22	June 1	49.83	Dec. 9	50.10
Aug. 11	49.05				

B4-60-34cc

Date	Water level	Date	Water level	Date	Water level
May 11, 1938	64.45	Nov. 6, 1940	67.10	Apr. 1, 1943	65.44
Dec. 8	64.29	May 7, 1941	65.31	Nov. 18	67.72
Apr. 25, 1939	63.60	Nov. 6	67.90	May 1, 1944	65.42
Oct. 25	66.04	Apr. 18, 1942	65.80	Oct. 23	69.62
May 25, 1940	64.20	Nov. 19	67.28	Apr. 30, 1945	[ee]66.18

B4-60-34dc

Date	Water level	Date	Water level	Date	Water level
Apr. 26, 1946	[ff]67.16	Apr. 18, 1948	67.88	Apr. 14, 1949	69.09
Oct. 28	71.13	June 3	69.26	May 4	68.75
Apr. 30, 1947	67.40	Aug. 11	[gg]84.90	June 16	68.36
Aug. 18	74.44	Sept. 8	75.85	Aug. 2	75.65
Oct. 3	73.55	Oct. 4	75.61	Oct. 14	74.86
Nov. 4	71.96	Nov. 5	73.14	Dec. 12	71.99
Dec. 8	70.65	Dec. 6	71.90	Feb. 3, 1950	70.42
Jan. 6, 1948	69.98	Jan. 14, 1949	70.68	Apr. 11	69.10
Feb. 3	69.25	Feb. 14	70.02	Oct. 12	78.08
Mar. 2	68.72	Mar. 11	69.60	Dec. 9	78.55

B5-55-28bc

Date	Water level	Date	Water level	Date	Water level
Nov. 5, 1947	36.10	Sept. 10, 1948	35.72	Aug. 4, 1949	36.05
Dec. 9	36.40	Oct. 7	36.29	Oct. 19	33.59
Jan. 2, 1948	36.90	Nov. 1	36.30	Dec. 6	34.65
Feb. 4	37.51	Dec. 6	36.50	Feb. 7, 1950	36.55
Mar. 8	38.21	Jan. 19, 1949	38.95	Apr. 6	38.20
Apr. 14	38.90	Feb. 8	39.20	May 26	37.79
May 14	38.90	Mar. 8	39.55	Aug. 4	37.85
June 7	37.61	Apr. 30	39.81	Oct. 18	38.02
July 13	36.81	May 31	38.95	Dec. 7	38.69
Aug. 6	35.79	July 8	36.84		

B5-55-35dd

Date	Water level	Date	Water level	Date	Water level
Oct. 15, 1935	18.82	Nov. 19, 1943	18.80	Feb. 4, 1948	18.26
Apr. 22, 1936	19.29	May 4, 1944	20.10	Mar. 8	18.30
Nov. 12	19.80	Oct. 24	18.84	Apr. 16	18.42
Apr. 29, 1937	19.80	May 1, 1945	19.51	June 7	17.73
Nov. 29	18.48	Nov. 1	18.12	July 12	17.54
May 3, 1938	19.81	Apr. 25, 1946	19.44	Aug. 6	18.49
Dec. 9	18.89	Oct. 29	18.74	Sept. 10	17.61
Apr. 26, 1939	18.80	May 1, 1947	17.70	Oct. 7	17.34
Nov. 26	20.15	July 9	17.70	Nov. 1	17.10
Apr. 24, 1940	19.80	Aug. 28	17.97	Dec. 7	17.72
Nov. 8	20.60	Jan. 2, 1948	18.16	Jan. 19, 1949	18.09

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B5-55-35dd—Continued

Date	Water level	Date	Water level	Date	Water level
Feb. 8, 1949	18.22	Aug. 4, 1949	17.56	May 31, 1950	18.50
Mar. 8	18.23	Oct. 19	16.35	Aug. 8	18.72
Apr. 8	18.46	Dec. 6	17.67	Oct. 20	18.49
June 6	18.42	Feb. 7, 1950	18.41	Dec. 7	18.20
July 8	17.87	Apr. 12	18.42		

B5-59-30cd

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1947	4.20	May 13, 1948	4.70	Mar. 11, 1949	4.97
Oct. 10	4.33	June 3	4.24	Apr. 6	4.64
Nov. 3	4.57	July 7	4.84	May 4	4.94
Dec. 6	4.86	Aug. 12	4.18	June 14	4.08
Jan. 5, 1948	4.96	Sept. 9	4.20	July 13	2.63
Feb. 4	4.80	Oct. 1	4.38	Aug. 1	3.65
Mar. 2	5.10	Nov. 5	4.74	Oct. 14	4.32
Apr. 18	5.25	Dec. 3	4.98	Dec. 8	[a]4.87

B5-59-34cd

Date	Water level	Date	Water level	Date	Water level
Sept. 10, 1947	7.35	Aug. 12, 1948	8.76	July 13, 1949	10.69
Oct. 10	9.10	Sept. 9	7.16	Aug. 1	9.68
Nov. 3	9.91	Oct. 1	7.52	Oct. 14	9.85
Dec. 6	11.92	Nov. 5	9.57	Dec. 8	12.05
Jan. 5, 1948	12.73	Dec. 3	11.21	Feb. 3, 1950	13.54
Feb. 4	13.45	Feb. 11, 1949	13.64	Apr. 10	14.91
Mar. 2	14.06	Mar. 11	13.56	May 24	13.68
Apr. 18	14.85	Apr. 6	13.98	Aug. 3	8.08
May 13	14.80	May 4	14.33	Oct. 17	8.94
June 3	12.94	June 14	13.99	Dec. 15	11.19
July 7	11.84				

B5-60-12dc

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1947	11.80	July 7, 1948	11.79	July 13, 1949	10.92
Oct. 13	10.18	Aug. 12	11.65	Aug. 1	10.94
Nov. 3	12.06	Sept. 9	11.69	Oct. 14	12.17
Dec. 6	11.90	Oct. 1	11.65	Dec. 8	11.05
Jan. 5, 1948	11.96	Nov. 5	11.62	Feb. 3, 1950	11.10
Feb. 4	11.94	Dec. 6	11.55	Apr. 10	11.44
Mar. 2	11.87	Mar. 11, 1949	11.57	May 24	11.35
Apr. 15	12.85	Apr. 6	11.42	Aug. 3	11.70
May 13	11.90	May 4	9.11	Oct. 17	11.72
June 3	11.81	June 14	11.10	Dec. 15	11.76

SEDGWICK COUNTY, COLO.

B11-45-5ba

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1947	11.88	Oct. 8, 1948	12.48	Oct. 7, 1949	11.23
Oct. 7	11.85	Jan. 17, 1949	13.75	Dec. 14	13.15
Nov. 5	12.60	Feb. 9	14.23	Feb. 9, 1950	14.09
Dec. 13	12.24	Mar. 4	14.17	Apr. 13	14.51
Jan. 3, 1948	14.25	Apr. 12	14.02	June 1	13.52
Feb. 10	14.41	May 5	14.52	Aug. 8	13.72
Mar. 15	14.70	June 8	13.82	Oct. 19	13.38
Apr. 19	14.66	Aug. 11	13.62	Dec. 1	13.68
June 8	13.06				

See footnotes at end of table.

421283 O -57 -10

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

SEDGWICK COUNTY, COLO.—Continued

B11-46-18db

Date	Water level	Date	Water level	Date	Water level
Dec. 13, 1947	7.18	Nov. 8, 1948	7.19	Oct. 7, 1949	6.49
Jan. 4, 1948	6.62	Dec. 7	7.08	Dec. 13	7.12
Feb. 10	5.83	Feb. 10, 1949	5.61	Feb. 8, 1950	7.02
Mar. 12	5.98	Mar. 2	6.49	Apr. 12	7.45
Apr. 19	6.85	Apr. 12	6.72	June 1	8.03
July 8	7.30	May 5	7.54	Aug. 8	7.74
Aug. 2	7.79	June 1	6.73	Oct. 19	8.28
Sept. 14	7.65	July 5	5.85	Dec. 1	7.48
Oct. 8,	7.56				

B11-47-28bb

Date	Water level	Date	Water level	Date	Water level
June 24, 1948	2.51	Feb. 10, 1949	4.06	Dec. 14, 1949	4.21
Aug. 2	hh16.48	Mar. 2	3.68	Feb. 8, 1950	4.66
Sept. 14	5.03	Apr. 7	3.41	Apr. 12	4.45
Oct. 8	4.73	May 5	4.65	Aug. 8	2.84
Nov. 8	4.10	July 5	4.22	Oct. 19	4.39
Dec. 7	4.28	Aug. 11	4.53	Dec. 2	4.00
Jan. 17, 1949	3.48	Oct. 7	4.86		

B12-44-27bc

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1947	3.64	Aug. 5, 1948	3.78	July 7, 1949	3.08
Oct. 7	3.65	Sept. 14	3.96	Aug. 12	3.79
Nov. 5	3.70	Oct. 9	3.92	Oct. 7	2.76
Dec. 13	3.80	Nov. 10	3.93	Dec. 13	3.44
Jan. 4, 1948	3.67	Nov. 29	3.77	Feb. 9, 1950	3.56
Feb. 10	3.78	Feb. 9, 1949	3.64	Apr. 14	3.48
Mar. 16	3.40	Mar. 5	3.38	June 1	3.83
Apr. 19	3.60	Apr. 12	3.22	Aug. 8	2.86
June 8	3.88	May 5	3.75	Oct. 20	3.19
July 9	3.89	June 8	2.66	Dec. 2	3.53

B12-44-31ba

Date	Water level	Date	Water level	Date	Water level
Sept. 16, 1947	22.37	Aug. 4, 1948	23.42	June 8, 1949	24.06
Oct. 7	22.32	Sept. 13	22.66	Aug. 11	21.83
Nov. 5	23.30	Oct. 8	22.91	Oct. 6	20.59
Dec. 14	23.34	Nov. 8	23.21	Dec. 13	22.87
Jan. 4, 1948	23.65	Nov. 29	23.49	Feb. 9, 1950	23.56
Feb. 10	24.10	Jan. 17, 1949	24.08	Apr. 13	24.19
Mar. 15	24.56	Feb. 9	24.30	June 1	24.04
Apr. 19	24.60	Mar. 4	24.15	Aug. 8	23.65
June 8	24.68	Apr. 12	24.19	Oct. 19	23.14
July 9	23.35	May 5	24.42	Dec. 1	23.64

WASHINGTON COUNTY, COLO.

B5-54-2bd

Date	Water level	Date	Water level	Date	Water level
Aug. 28, 1947	11.80	Mar. 8, 1948	12.30	Nov. 1, 1948	15.95
Oct. 6	14.83	Apr. 16	12.64	Dec. 6	15.86
Nov. 4	12.40	July 12	10.15	Jan. 20, 1949	15.43
Dec. 10	12.89	Aug. 6	10.85	Feb. 8	15.19
Jan. 2, 1948	13.96	Sept. 10	13.99	Mar. 3	14.94
Feb. 6	12.55	Oct. 7	16.25	Apr. 8	12.39

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WASHINGTON COUNTY, COLO.—Continued

B5-54-2bd—Continued

Date	Water level	Date	Water level	Date	Water level
May 4, 1949	12.07	Dec. 1, 1949	15.66	May 31, 1950	13.92
June 6	11.25	Feb. 7, 1950	13.25	Oct. 18	17.67
Oct. 19	15.31	Apr. 12	14.05	Dec. 7	17.25

B5-54-20bc

Date	Water level	Date	Water level	Date	Water level
Nov. 8, 1940	18.67	Oct. 6, 1947	13.75	Feb. 8, 1949	14.50
May 6, 1941	18.02	Nov. 3	13.80	Mar. 8	14.99
Nov. 5	16.42	Dec. 9	14.30	Apr. 8	15.11
Apr. 17, 1942	16.48	Jan. 2, 1948	14.07	May 3	16.21
Nov. 20	14.35	Feb. 4	15.06	May 31	11.36
Apr. 2, 1943	15.42	Mar. 8	14.95	July 8	14.07
Nov. 19	14.57	Apr. 16	15.17	Aug. 4	13.80
May 4, 1944	15.75	June 7	14.55	Oct. 19	12.95
Oct. 24	15.05	July 12	13.79	Dec. 1	13.28
May 1, 1945	16.21	Aug. 6	14.55	Feb. 6, 1950	14.27
Nov. 1	14.72	Sept. 10	14.63	Apr. 6	14.54
Apr. 25, 1946	15.56	Oct. 7	15.60	May 26	14.80
Oct. 29	15.88	Nov. 1	14.29	Oct. 18	14.87
May 1, 1947	16.51	Dec. 6	14.20	Dec. 7	14.81
Aug. 21	14.70				

B5-54-21ca

Date	Water level	Date	Water level	Date	Water level
Aug. 26, 1947	12.90	Sept. 10, 1948	11.73	July 8, 1949	11.05
Oct. 6	10.58	Oct. 7	10.52	Aug. 4	10.70
Nov. 3	11.40	Nov. 1	11.25	Oct. 19	10.75
Dec. 9	11.77	Dec. 6	11.80	Dec. 1	11.15
Jan. 2, 1948	11.92	Jan. 20, 1949	12.67	Feb. 7, 1950	11.37
Feb. 4	12.83	Feb. 8	12.99	Apr. 12	13.05
Mar. 8	12.85	Mar. 8	13.22	May 31	11.69
Apr. 16	13.73	Apr. 8	13.31	Aug. 4	11.88
June 7	11.99	May 3	13.22	Oct. 20	11.84
July 12	11.15	June 6	10.36	Dec. 7	12.39
Aug. 6	[ii]36.66				

B5-54-30cb

Date	Water level	Date	Water level	Date	Water level
Aug. 21, 1947	21.00	Sept. 10, 1948	17.13	Aug. 4, 1949	16.20
Nov. 3	15.70	Oct. 7	16.24	Oct. 19	14.55
Dec. 9	16.35	Nov. 1	16.23	Dec. 1	15.59
Jan. 2, 1948	16.62	Dec. 6	16.56	Feb. 6, 1950	15.85
Feb. 4	16.69	Jan. 19, 1949	16.74	Apr. 6	16.98
Mar. 8	16.79	Feb. 8	16.67	May 26	18.49
Apr. 16	17.10	Mar. 8	16.78	Oct. 18	16.82
June 7	16.32	Apr. 8	16.99	Dec. 7	18.77
July 12	15.69	May 3	17.05		

C1-55-21bd1

Date	Water level	Date	Water level	Date	Water level
Aug. 14, 1947	12.20	Apr. 14, 1948	11.89	Nov. 2, 1948	12.23
Oct. 29	11.98	May 14	[jj]23.20	Dec. 8	12.28
Dec. 9	11.83	July 5	12.33	Mar. 8, 1949	12.12
Dec. 31	11.93	Aug. 2	12.21	Apr. 11	11.95
Feb. 3, 1948	11.84	Sept. 1	12.42	May 30	12.50
Mar. 8	11.98	Oct. 7	12.42	July 4	11.97

See footnotes at end of table.

Water-level measurement in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WASHINGTON COUNTY, COLO.—Continued

C1-55-21bd1—Continued

Date	Water level	Date	Water level	Date	Water level
Aug. 4, 1949	12.25	Feb. 6, 1950	12.19	Aug. 7	12.83
Oct. 11	12.39	Apr. 6	12.11	Oct. 16	12.82
Dec. 1	12.24	May 31	12.71	Dec. 4	12.59

WELD COUNTY, COLO.

B1-61-7cd

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	20.70	June 4, 1948	19.13	Mar. 14, 1949	19.59
Oct. 7	20.85	June 30	19.45	Apr. 15	19.48
Nov. 5	20.66	Aug. 4	19.92	May 9	19.32
Dec. 4	20.52	Oct. 4	20.01	June 16	18.80
Jan. 8, 1948	20.55	Nov. 3	20.12	July 12	18.44
Feb. 2	20.55	Dec. 7	19.78	Aug. 2	18.65
Mar. 11	20.04	Jan. 15, 1949	19.04	Oct. 17	[kk]18.29
Apr. 12	19.10	Feb. 14	19.07		

B1-62-8bb

Date	Water level	Date	Water level	Date	Water level
Oct. 21, 1947	32.99	Oct. 5, 1948	33.14	Aug. 2, 1949	30.65
Nov. 5	33.00	Nov. 8	33.30	Oct. 18	31.02
Dec. 8	33.70	Dec. 7	33.14	Dec. 9	31.66
Feb. 2, 1948	33.14	Jan. 15, 1949	33.25	Feb. 1, 1950	31.94
Mar. 11	33.58	Feb. 15	33.32	Apr. 5	32.40
Apr. 12	33.12	Mar. 15	33.35	May 23	32.46
June 4	33.07	Apr. 15	33.20	Aug. 3	32.67
July 1	33.09	May 9	33.31	Oct. 13	32.48
Aug. 13	33.17	July 12	30.69	Dec. 10	32.72
Sept. 13	33.19				

B1-62-13ad

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	23.07	Sept. 14, 1948	20.53	Aug. 2, 1949	19.68
Oct. 8	22.23	Oct. 4	20.47	Oct. 17	20.14
Nov. 5	21.65	Nov. 3	20.34	Dec. 7	18.65
Dec. 4	21.44	Dec. 7	20.34	Feb. 1, 1950	19.50
Jan. 8, 1948	21.32	Jan. 15, 1949	20.28	Apr. 10	19.48
Mar. 11	20.98	Feb. 14	20.28	Aug. 3	20.88
Apr. 12	20.46	Mar. 15	20.22	Oct. 14	20.43
Aug. 4	20.94	June 16	19.59	Dec. 10	20.02
Aug. 16	[ll]34.79	July 12	19.32		

B1-63-2cc

Date	Water level	Date	Water level	Date	Water level
Apr. 27, 1944	60.71	July 21, 1944	61.77	Oct. 13, 1944	63.04
May 4	60.72	July 28	62.09	Oct. 20	62.83
May 12	60.56	Aug. 4	63.13	Oct. 27	62.73
May 19	60.55	Aug. 11	63.25	Nov. 3	62.45
May 26	60.34	Aug. 18	63.12	Nov. 10	62.32
June 2	60.18	Aug. 25	63.31	Nov. 17	62.12
June 9	60.10	Sept. 1	63.23	Nov. 24	61.92
June 16	60.83	Sept. 8	63.55	Dec. 1	61.79
June 23	60.79	Sept. 15	63.07	Dec. 8	61.64
June 30	61.28	Sept. 22	63.37	Dec. 15	61.49
July 7	61.57	Sept. 29	63.23	Dec. 22	61.36
July 14	61.49	Oct. 6	63.32	Dec. 29	61.20

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B1-63-2cc—Continued

Date	Water level	Date	Water level	Date	Water level
Jan. 5, 1945	61.07	Mar. 28, 1946	60.87	Aug. 29, 1947	62.45
Jan. 12	60.97	Apr. 5	61.65	Sept. 5	62.54
Jan. 19	60.87	Apr. 12	61.55	Sept. 12	62.41
Jan. 26	60.71	Apr. 19	61.81	Sept. 19	61.81
Feb. 2	60.61	Apr. 26	62.16	Sept. 26	61.36
Feb. 9	60.56	May 3	62.69	Oct. 3	60.98
Feb. 16	60.42	May 12	62.9	Oct. 10	60.68
Feb. 23	60.33	May 19	63.06	Oct. 29	59.87
Mar. 2	60.21	May 26	63.00	Nov. 5	59.67
Mar. 9	60.13	June 2	63.56	Nov. 12	59.46
Mar. 16	60.09	June 9	64.10	Nov. 19	59.22
Mar. 23	60.18	June 16	64.74	Nov. 26	59.03
Mar. 30	60.38	June 23	64.64	Dec. 3	58.83
Apr. 6	60.00	June 30	65.12	Dec. 10	58.67
Apr. 13	60.30	July 8	65.47	Dec. 17	58.45
Apr. 20	59.86	July 15	66.11	Dec. 24	58.30
Apr. 27	59.75	July 22	65.49	Dec. 31	58.12
May 4	59.86	July 29	66.08	Jan. 7, 1948	57.90
May 11	59.95	Aug. 5	66.61	Jan. 14	57.77
May 18	60.21	Aug. 12	67.26	Jan. 21	57.63
May 25	60.24	Aug. 19	67.29	Jan. 28	57.50
June 1	60.53	Aug. 26	67.51	Feb. 15	57.14
June 8	60.82	Sept. 2	67.17	Feb. 22	57.01
June 15	60.20	Sept. 10	66.94	Feb. 29	56.89
June 22	60.15	Sept. 27	66.44	Mar. 7	56.80
June 29	61.80	Oct. 8	66.01	Mar. 14	56.63
July 17	63.34	Oct. 15	65.77	Mar. 21	56.56
July 24	63.80	Oct. 22	65.51	Mar. 28	56.45
July 31	64.62	Oct. 29	65.29	Apr. 8	56.31
Aug. 7	64.98	Nov. 5	65.08	Apr. 15	56.17
Aug. 14	65.40	Nov. 15	64.75	Apr. 23	56.24
Aug. 21	65.92	Nov. 22	64.58	Apr. 30	56.00
Aug. 28	65.93	Dec. 4	64.23	May 7	56.10
Sept. 6	66.42	Dec. 11	64.01	May 14	55.68
Sept. 13	68.09	Dec. 18	63.85	May 21	55.73
Sept. 20	65.71	Jan. 10, 1947	63.20	May 28	55.63
Sept. 28	65.20	Jan. 22	62.95	June 4	56.04
Oct. 5	64.70	Jan. 29	62.80	June 11	56.07
Oct. 12	64.31	Feb. 5	62.64	June 18	57.16
Oct. 19	64.01	Feb. 12	62.55	June 25	56.63
Oct. 26	63.74	Feb. 19	62.44	July 3	56.40
Nov. 2	63.50	Feb. 26	62.29	July 10	57.29
Nov. 9	63.24	Mar. 5	62.22	July 17	57.25
Nov. 16	63.01	Mar. 12	62.12	Aug. 2	58.75
Nov. 23	62.80	Mar. 19	61.95	Aug. 9	59.08
Nov. 30	62.63	Mar. 26	61.88	Aug. 16	59.17
Dec. 7	62.51	Apr. 5	61.75	Aug. 23	59.48
Dec. 14	62.39	Apr. 24	61.49	Aug. 30	60.15
Dec. 21	62.22	May 1	61.67	Sept. 5	60.62
Dec. 28	62.07	May 14	61.08	Sept. 13	61.57
Jan. 4, 1946	61.94	May 21	60.88	Sept. 20	61.30
Jan. 13	61.74	May 28	60.60	Sept. 27	60.79
Jan. 20	61.70	June 4	60.43	Oct. 4	60.60
Jan. 27	61.62	June 11	60.32	Oct. 11	60.29
Feb. 7	61.50	June 21	60.07	Nov. 10	59.03
Feb. 14	61.36	July 1	59.66	Nov. 17	58.80
Feb. 21	61.26	July 9	59.70	Nov. 24	58.58
Feb. 28	61.20	July 19	60.42	Nov. 30	58.40
Mar. 7	61.19	July 29	60.90	Dec. 17	57.87
Mar. 14	61.02	Aug. 11	62.5	Dec. 24	57.71
Mar. 21	60.92	Aug. 21	62.54	Dec. 31	57.55

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-63-2cc—Continued

Date	Water level	Date	Water level	Date	Water level
Jan. 7, 1949	57.34	Sept. 11, 1949	56.62	May 14, 1950	51.87
Jan. 14	57.17	Sept. 18	56.50	May 21	51.81
Jan. 21	57.00	Sept. 25	56.63	May 28	52.50
Jan. 28	56.89	Oct. 2	56.40	June 4	53.09
Feb. 4	56.67	Oct. 9	56.19	June 11	52.92
Feb. 11	56.50	Oct. 16	55.92	June 18	53.90
Feb. 18	56.37	Oct. 23	55.73	June 25	54.02
Feb. 25	56.25	Oct. 30	55.50	July 2	54.61
Mar. 4	56.10	Nov. 6	55.23	July 9	55.55
Mar. 11	55.98	Nov. 13	55.00	July 16	56.20
Mar. 18	55.88	Nov. 20	54.78	July 23	56.82
Mar. 25	55.73	Nov. 27	54.48	July 30	57.45
Apr. 1	55.61	Dec. 4	54.31	Aug. 6	58.36
Apr. 8	55.50	Dec. 11	54.07	Aug. 9	58.75
Apr. 15	55.42	Dec. 18	53.86	Aug. 21	60.15
Apr. 22	55.29	Dec. 25	53.72	Aug. 27	60.69
Apr. 29	55.19	Jan. 1, 1950	53.51	Sept. 3	61.43
May 6	55.22	Jan. 8	53.32	Sept. 10	61.54
May 13	55.06	Jan. 15	53.19	Sept. 17	60.69
May 20	54.97	Jan. 22	53.01	Sept. 24	60.44
May 27	54.98	Jan. 29	52.92	Oct. 1	59.87
June 3	55.61	Feb. 5	52.74	Oct. 8	59.52
June 10	55.51	Feb. 12	52.63	Oct. 15	59.21
June 17	54.87	Feb. 19	52.50	Oct. 22	58.94
June 24	54.65	Feb. 26	52.40	Oct. 29	58.66
July 1	54.86	Mar. 5	52.25	Nov. 5	58.43
July 8	55.27	Mar. 12	52.18	Nov. 12	58.21
July 15	55.45	Mar. 19	52.10	Nov. 19	57.95
July 22	55.64	Mar. 26	51.90	Nov. 26	57.76
July 29	56.07	Apr. 2	51.83	Dec. 3	57.56
Aug. 5	56.75	Apr. 9	51.77	Dec. 10	57.39
Aug. 12	56.97	Apr. 16	52.02	Dec. 17	57.20
Aug. 19	56.81	Apr. 23	51.74	Dec. 24	57.01
Aug. 26	56.60	Apr. 30	51.78	Dec. 31	56.82
Sept. 4	56.90	May 7	52.06		

B1-63-2dd1

Date	Water level	Date	Water level	Date	Water level
May 15, 1942	50.27	Apr. 24, 1946	46.15	Nov. 8, 1948	41.18
June 8	49.76	Oct. 30	44.20	Dec. 7	41.34
July 7	49.35	Apr. 30, 1947	45.81	Jan. 15, 1949	41.43
Aug. 4	49.05	Sept. 19	43.67	Feb. 15	41.56
Sept. 4	48.86	Oct. 8	43.60	Mar. 14	41.74
Oct. 6	48.79	Oct. 29	43.20	Apr. 15	42.02
Nov. 19	48.71	Nov. 5	43.17	May 9	41.83
Apr. 1, 1943	48.75	Dec. 8	43.56	June 16	41.35
May 5	48.73	Jan. 9, 1948	43.64	July 12	41.11
June 1	48.69	Feb. 2	43.60	Aug. 2	40.70
July 9	48.53	Mar. 11	43.59	Oct. 18	38.97
Aug. 4	48.00	Apr. 12	43.38	Dec. 9	38.86
Sept. 2	47.51	Apr. 23	43.43	Feb. 1, 1950	39.10
Oct. 6	47.00	June 4	43.18	Apr. 5	39.70
Nov. 16	47.02	July 1	42.64	May 23	39.30
Apr. 25, 1944	47.42	Aug. 13	41.95	Aug. 3	38.64
Nov. 8	45.79	Sept. 13	41.41	Oct. 13	38.15
May 3, 1945	46.32	Oct. 5	41.02	Dec. 10	39.29
Oct. 31	45.03				

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B1-63-3cc

Date	Water level	Date	Water level	Date	Water level
May 14, 1942	60.36	Oct. 31, 1945	55.42	Sept. 13, 1948	52.11
June 8	59.47	May 16, 1946	53.41	Oct. 5	51.62
July 7	58.22	Oct. 30	56.41	Nov. 8	49.15
Aug. 5	58.07	Apr. 30, 1947	52.00	Dec. 7	48.14
Sept. 2	57.19	Sept. 19	52.32	Jan. 15, 1949	47.47
Oct. 5	55.70	Oct. 8	51.03	Feb. 15	47.02
Nov. 18	54.25	Oct. 29	49.53	Mar. 14	45.80
Mar. 31, 1943	51.62	Nov. 5	49.33	Apr. 15	45.57
May 5	51.57	Dec. 8	48.37	May 9	45.85
June 1	50.60	Jan. 9, 1948	47.30	June 16	45.34
Sept. 2	54.10	Feb. 2	46.92	July 12	46.69
Oct. 6	54.54	Mar. 11	46.22	Oct. 18	46.08
Nov. 17	53.18	Apr. 12	46.82	Dec. 9	43.98
Apr. 25, 1944	51.11	Apr. 23	45.70	Feb. 1, 1950	43.97
Nov. 8	52.90	June 5	46.74	Apr. 5	45.04
May 3, 1945	50.25	July 1	45.33	Oct. 13	51.88

B1-63-9dd

Date	Water level	Date	Water level	Date	Water level
May 14, 1942	63.08	Apr. 30, 1947	56.15	Nov. 8, 1948	50.57
June 9	62.29	Sept. 19	54.04	Dec. 7	50.06
Aug. 5	60.17	Oct. 8	53.37	Feb. 15, 1949	49.68
Oct. 6	58.92	Oct. 29	52.70	Mar. 14	48.55
Nov. 18	57.90	Nov. 5	51.81	Apr. 15	48.14
Mar. 31, 1943	55.88	Dec. 8	51.54	May 9	48.50
June 3	55.39	Jan. 9, 1948	51.31	June 16	48.13
Oct. 5	57.75	Feb. 2	50.30	Oct. 18	48.44
Nov. 18	56.90	Mar. 11	49.66	Dec. 9	47.65
Apr. 25, 1944	55.23	Apr. 12	49.05	Feb. 1, 1950	46.44
Nov. 8	56.37	Apr. 23	48.98	Apr. 5	45.85
May 3, 1945	54.54	June 4	48.64	Oct. 13	52.53
Oct. 31	58.24	Oct. 5	51.03	Dec. 10	52.34
Oct. 30, 1946	59.31				

B1-63-10cd

Date	Water level	Date	Water level	Date	Water level
Apr. 25, 1934	51.3	Sept. 2, 1942	65.47	Feb. 2, 1948	54.70
Oct. 21	59	Oct. 5	64.42	Mar. 11	54.07
Nov. 11	57	Nov. 18	62.58	Apr. 12	53.70
Apr. 16, 1935	55.2	Apr. 31, 1943	60.52	Apr. 23	53.34
Oct. 16	59.7	May 5	60.22	June 4	54.31
Feb. 15, 1936	55.3	June 2	60.05	July 1	54.38
Nov. 13	61.7	July 5	62.22	Sept. 13	59.43
Apr. 29, 1937	60.1	Oct. 5	65.00	Oct. 5	58.65
Oct. 30	65.2	Nov. 18	62.42	Nov. 8	56.34
May 11, 1938	63.10	Apr. 25, 1944	59.80	Dec. 7	55.16
Dec. 9	64.12	Nov. 8	61.59	Jan. 15, 1949	54.10
Apr. 26, 1939	62.89	May 3, 1945	59.03	Feb. 15	53.55
Oct. 26	67.25	Oct. 31	63.55	Mar. 14	53.19
Apr. 25, 1940	63.75	Apr. 24, 1946	62.08	Apr. 15	53.62
Nov. 30	67.55	Oct. 30	64.40	May 9	52.81
May 5, 1941	65.61	Apr. 30, 1947	60.62	June 16	52.90
Nov. 4	70.35	Sept. 19	59.70	Oct. 18	53.57
Apr. 16, 1942	67.41	Oct. 8	58.53	Dec. 9	51.08
May 14	67.10	Oct. 29	57.42	Apr. 5, 1950	50.95
June 9	66.48	Nov. 5	57.08	May 23	52.85
July 6	65.60	Dec. 8	56.17	Oct. 13	58.98
Aug. 5	65.36	Jan. 9, 1948	55.28	Dec. 10	56.28

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-63-15dc1

Date	Water level	Date	Water level	Date	Water level
May 5, 1943	84.88	May 3, 1945	84.14	Nov. 5, 1947	79.02
June 3	84.23	Oct. 31	90.65	Jan. 9, 1948	77.90
Sept. 1	89.70	Oct. 30, 1946	90.48	Feb. 2	77.45
Oct. 4	88.60	Apr. 30, 1947	82.62	Mar. 11	77.30
Nov. 18	86.81	Oct. 8	81.75	Apr. 12	76.75
Apr. 25, 1944	84.56	Oct. 29	79.54	July 1	[a]76.98
Nov. 8	86.98				

B1-63-22dd

Date	Water level	Date	Water level	Date	Water level
Nov. 30, 1940	94.54	Oct. 31, 1945	91.80	Dec. 7, 1948	80.05
May 5, 1941	93.53	Oct. 30, 1946	90.95	Jan. 15, 1949	79.23
Nov. 4	97.22	Apr. 30, 1947	83.01	Feb. 15	79.08
Apr. 16, 1942	95.03	Sept. 19	85.05	Mar. 14	78.97
May 14	92.86	Oct. 8	81.66	Apr. 15	78.84
June 9	90.74	Oct. 29	80.60	May 9	78.69
July 6	89.25	Nov. 5	80.40	June 16	79.39
Nov. 18	88.24	Dec. 8	79.47	July 12	79.80
Mar. 30, 1943	86.68	Feb. 2, 1948	79.07	Oct. 18	82.39
May 5	86.34	Mar. 11	79.14	Dec. 9	80.93
June 3	86.62	Apr. 12	78.49	Feb. 1, 1950	79.37
Sept. 1	90.25	Apr. 23	78.11	Apr. 5	79.03
Nov. 18	88.41	June 4	75.41	May 23	79.98
Apr. 25, 1944	87.20	July 1	75.84	Oct. 13	86.99
Nov. 8	88.49	Nov. 8	80.63	Dec. 10	84.89
May 3, 1945	86.85				

B1-63-27dc

Date	Water level	Date	Water level	Date	Water level
May 15, 1942	105.10	Oct. 30, 1946	99.50	Dec. 7, 1948	91.45
July 6	100.76	Apr. 30, 1947	93.10	Jan. 15, 1949	90.99
Sept. 3	101.20	Oct. 8	94.23	Feb. 15	92.25
Oct. 6	99.80	Oct. 29	92.45	Mar. 14	91.10
Nov. 18	98.67	Nov. 5	92.23	Apr. 15	90.72
Apr. 30, 1943	97.58	Dec. 8	91.87	May 9	90.56
May 5	97.42	Jan. 9, 1948	91.67	June 16	90.39
June 3	97.13	Apr. 12	91.20	Oct. 18	91.72
Oct. 4	99.34	Apr. 23	90.98	Dec. 9	90.91
Nov. 18	98.13	June 4	90.74	Feb. 1, 1950	90.58
Apr. 25, 1944	97.26	July 1	90.42	Apr. 5	90.50
Nov. 8	97.63	Sept. 13	97.66	May 23	91.03
May 3, 1945	96.88	Oct. 5	93.67	Oct. 13	96.39
Oct. 31	100.53	Nov. 8	91.75	Dec. 10	94.50
Apr. 24, 1946	99.22				

B1-63-28ab

Date	Water level	Date	Water level	Date	Water level
May 15, 1942	82.90	July 5, 1943	81.34	Oct. 30, 1946	84.41
June 9	80.42	Aug. 3	81.03	Apr. 30, 1947	70.36
July 6	81.25	Sept. 1	81.60	Sept. 22	72.79
Aug. 5	81.10	Oct. 4	82.52	Oct. 8	72.70
Sept. 3	82.05	Nov. 18	83.86	Nov. 5	72.20
Oct. 6	82.94	Apr. 25, 1944	84.81	Dec. 8	73.54
Nov. 18	83.57	Nov. 8	84.05	Jan. 9, 1948	74.60
Apr 30, 1943	83.65	May 3, 1945	84.61	Feb. 2	76.85
May 5	81.17	Oct. 31	84.44	Mar. 11	75.60
June 3	81.40	Apr. 24, 1946	78.82	Apr. 12	[mm]71.72

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-28ab—Continued

Date	Water level	Date	Water level	Date	Water level
June 4, 1948	67.19	Jan. 15, 1949	75.30	Feb. 1, 1950	76.04
July 1	68.62	Apr. 15	76.20	Apr. 5	76.59
Aug. 13	69.33	May 9	76.45	May 23	76.69
Sept. 13	70.33	July 12	75.55	Aug. 3	76.83
Oct. 5	71.60	Aug. 2	73.33	Oct. 13	77.95
Nov. 8	75.18	Oct. 18	73.72	Dec. 10	77.62
Dec. 7	75.00	Dec. 9	75.25		

B2-61-11cd

Date	Water level	Date	Water level	Date	Water level
Nov. 5, 1947	26.44	Oct. 4, 1948	27.08	Aug. 2, 1949	26.09
Dec. 4	26.30	Nov. 4	27.89	Oct. 17	26.36
Jan. 8, 1948	26.26	Dec. 7	26.62	Dec. 7	25.69
Feb. 2	26.13	Jan. 15, 1949	26.43	Feb. 1, 1950	25.40
Mar. 10	26.15	Feb. 15	26.44	Apr. 10	25.30
Apr. 12	26.04	Mar. 15	26.56	May 23	25.36
June 4	26.35	Apr. 15	26.25	Aug. 3	24.80
June 30	26.46	May 9	26.20	Oct. 14	26.68
Aug. 4	26.69	June 6	26.00	Dec. 10	26.48
Sept. 1	27.29	July 12	25.89		

B2-61-32cc

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	20.95	June 30, 1948	19.74	Apr. 15, 1949	20.26
Oct. 7	20.79	Sept. 14	21.24	May 9	20.08
Nov. 5	20.61	Oct. 4	21.24	June 16	19.77
Dec. 4	20.54	Nov. 3	20.87	Oct. 17	19.99
Jan. 8, 1948	20.53	Dec. 7	20.64	Dec. 7	19.79
Feb. 2	20.45	Jan. 15, 1949	20.48	Feb. 1, 1950	19.61
Mar. 11	20.33	Feb. 14	19.40	Apr. 10	19.48
Apr. 12	20.10	Mar. 14	20.38	Oct. 14	21.19

B2-62-6cb1

Date	Water level	Date	Water level	Date	Water level
Nov. 6, 1947	11.98	Oct. 5, 1948	13.12	July 12, 1949	[nn]8.94
Dec. 8	11.95	Nov. 4	12.90	Oct. 18	11.09
Jan. 9, 1948	11.80	Dec. 7	12.44	Dec. 9	10.48
Feb. 2	11.80	Jan. 15, 1949	12.37	Feb. 1, 1950	10.68
Mar. 11	11.96	Feb. 15	12.73	Apr. 5	10.72
Apr. 12	11.92	Mar. 14	12.19	May 23	10.48
June 5	11.79	Apr. 15	11.99	Aug. 3	11.94
July 1	12.29	May 9	11.94	Oct. 13	12.04
Aug. 5	12.97	June 6	10.92	Dec. 10	12.02
Sept. 13	13.08				

B2-62-7cc

Date	Water level	Date	Water level	Date	Water level
Sept. 23, 1947	19.50	Nov. 4, 1948	20.17	Aug. 2, 1949	17.48
Oct. 9	19.00	Dec. 7	20.07	Oct. 18	18.23
Nov. 5	19.12	Jan. 15, 1949	19.57	Dec. 9	18.30
Dec. 8	19.20	Feb. 15	20.10	Feb. 1, 1950	18.36
Apr. 12, 1948	18.98	Mar. 15	19.99	Apr. 5	18.36
June 5	19.08	Apr. 15	19.99	May 23	18.09
Aug. 5	20.01	May 9	19.82	Oct. 13	19.72
Sept. 13	20.27	June 13	18.97	Dec. 10	19.59
Oct. 5	20.07	July 12	17.25		

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B2-62-18cb

Date	Water level	Date	Water level	Date	Water level
Apr. 23, 1936	17.9	Oct. 10, 1945	25.4	Oct. 14, 1948	25.65
Sept. 9	19.0	Apr. 23, 1946	25.06	Nov. 4	25.67
Nov. 12	19.1	Oct. 31	24.40	Dec. 7	25.68
Apr. 29, 1937	19.4	Apr. 29, 1947	24.30	Jan. 15, 1949	25.78
June 11	19.6	Sept. 23	25.08	Feb. 15	25.75
Oct. 29	20.6	Oct. 9	24.94	Mar. 15	25.52
May 11, 1938	20.6	Oct. 29	24.43	Apr. 15	25.49
Dec. 9	21.8	Nov. 5	24.75	May 9	25.48
Apr. 26, 1939	20.9	Dec. 8	24.60	June 13	24.86
Oct. 26	22.1	Jan. 9, 1948	24.74	July 12	23.47
Apr. 25, 1940	22.4	Feb. 2	24.63	Oct. 18	24.04
Oct. 30	23.4	Mar. 11	24.48	Dec. 9	23.87
May 5, 1941	23.6	Apr. 12	24.47	Feb. 1, 1950	23.78
Nov. 4	24.1	Apr. 23	24.15	Apr. 5	23.54
Apr. 15, 1942	24.3	July 1	24.94	May 23	23.38
Mar. 31, 1943	23.1	Aug. 5	25.63	Oct. 13	25.29
Nov. 16	24.3	Sept. 13	25.53	Dec. 10	25.15
May 3, 1945	24.7				

B2-62-19cd

Date	Water level	Date	Water level	Date	Water level
July 30, 1930	27.7	May 21, 1942	34.46	Nov. 5, 1947	37.15
June 3, 1933	25.0	June 9	34.90	Dec. 8	36.57
Oct. 11	24.9	July 7	34.97	Jan. 9, 1948	36.30
Apr. 24, 1934	24.9	Aug. 4	35.36	Feb. 2	36.12
Aug. 7	25.8	Sept. 4	35.42	Mar. 11	35.92
Oct. 2	25.3	Oct. 9	34.56	Apr. 12	35.38
Apr. 16, 1935	26.5	Nov. 17	34.24	Apr. 23	35.21
Oct. 16	25.7	Mar. 31, 1943	33.83	June 5	38.28
Apr. 23, 1936	25.8	May 4	33.77	July 1	37.56
July 2	26.1	June 1	33.77	Oct. 5	40.11
Sept. 9	26.5	Aug. 5	37.00	Nov. 1	38.15
Nov. 12	27.12	Sept. 2	36.98	Dec. 7	35.63
Apr. 29, 1937	27.39	Oct. 6	35.90	Jan. 15, 1949	37.25
Oct. 29	28.85	Nov. 16	35.64	Feb. 15	37.06
May 11, 1938	29.70	Apr. 26, 1944	35.03	June 16	35.58
Dec. 9	31.00	Nov. 29	35.93	Aug. 2	38.35
Apr. 26, 1939	30.67	May 3, 1945	35.33	Oct. 18	37.35
Oct. 26	31.50	Oct. 30	37.12	Dec. 9	35.55
Apr. 25, 1940	31.90	Apr. 23, 1946	36.03	Feb. 1, 1950	35.56
Nov. 30	32.95	Oct. 31	36.16	Apr. 5	35.47
May 2, 1941	34.52	Apr. 29, 1947	35.27	Oct. 13	39.23
Nov. 4	35.37	Sept. 23	oo38.65	Dec. 10	37.97
Apr. 15, 1942	34.60	Oct. 29	36.98		

B2-63-15dc

Date	Water level	Date	Water level	Date	Water level
May 5, 1941	21.05	Oct. 30, 1945	22.38	Dec. 7, 1948	22.59
Nov. 4	22.30	Apr. 23, 1946	22.80	Jan. 15, 1949	21.47
Apr. 15, 1942	21.82	Oct. 31	23.00	Feb. 15	21.49
May 21	19.30	Apr. 29, 1947	21.02	Mar. 15	21.40
Aug. 4	19.96	Oct. 9	26.32	Apr. 15	21.13
Oct. 8	19.03	Oct. 29	21.30	May 9	20.66
Nov. 17	18.80	Nov. 5	21.03	June 16	16.48
Mar. 31, 1943	19.10	Dec. 8	20.55	July 12	23.48
June 2	19.66	Jan. 9, 1948	20.36	Oct. 18	19.20
July 8	22.49	Feb. 2	20.19	Dec. 9	18.98
Oct. 5	22.24	Mar. 11	19.92	Feb. 1, 1950	18.56
Nov. 17	21.47	Apr. 12	19.70	Apr. 5	18.08
Apr. 27, 1944	20.21	Apr. 23	22.76	May 23	PP22.95
Nov. 10	21.45	Oct. 5	28.48	Oct. 13	21.80
May 3, 1945	20.68	Nov. 4	27.08	Dec. 10	20.83

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B2-63-22cc

Date	Water level	Date	Water level	Date	Water level
May 22, 1942	34.38	Oct. 30, 1945	35.96	Nov. 4, 1948	34.96
June 10	32.86	Oct. 31, 1946	37.51	Dec. 7	33.72
July 7	30.96	Apr. 29, 1947	33.47	Jan. 15, 1949	32.92
Aug. 5	32.77	Sept. 23	35.40	Feb. 15	32.28
Sept. 4	33.87	Oct. 8	34.36	Mar. 15	31.73
Oct. 8	33.08	Oct. 29	33.02	Apr. 15	31.65
Nov. 17	32.11	Nov. 5	32.70	May 9	31.70
Mar. 31, 1943	31.48	Dec. 8	31.80	June 16	30.38
May 4	31.37	Jan. 9, 1948	31.40	Oct. 18	32.82
July 8	34.45	Feb. 2	30.97	Dec. 9	29.69
Aug. 4	36.13	Mar. 11	30.75	Feb. 1, 1950	28.87
Sept. 2	37.33	Apr. 12	30.35	Apr. 5	28.56
Nov. 17	35.30	July 1	32.79	May 23	30.20
Apr. 26, 1944	32.98	Sept. 13	38.38	Oct. 13	35.65
Nov. 10	34.66	Oct. 5	37.57	Dec. 10	33.39
May 3, 1945	32.30				

B2-63-22dc

Date	Water level	Date	Water level	Date	Water level
June 2, 1933	22.84	Nov. 17, 1943	38.65	Apr. 23, 1948	34.58
Oct. 11	25.03	Apr. 26, 1944	36.00	July 1	37.55
Apr. 24, 1934	24.0	Nov. 10	37.96	Oct. 5	43.53
Apr. 24, 1936	29.0	May 3, 1945	35.50	Nov. 4	39.11
Oct. 26, 1939	36.2	Nov. 30	39.43	Dec. 7	37.77
Nov. 4, 1940	38.7	Apr. 23, 1946	39.65	Jan. 15, 1949	36.58
May 1, 1941	37.40	Oct. 31	41.16	Feb. 15	36.02
Nov. 10	40.59	Apr. 29, 1947	36.30	Mar. 15	35.58
Apr. 15, 1942	38.7	Sept. 23	41.54	Apr. 15	35.59
May 22	37.5	Oct. 9	39.00	May 9	35.54
June 10	36.15	Oct. 29	36.60	June 16	34.11
July 7	34.69	Nov. 5	36.20	Oct. 18	35.39
Oct. 8	36.62	Dec. 8	35.09	Dec. 9	33.07
Nov. 17	35.10	Jan. 9, 1948	34.67	Feb. 1, 1950	32.32
Mar. 31, 1943	34.68	Feb. 2	34.38	Apr. 5	32.50
May 4	34.57	Mar. 11	33.91	Dec. 10	36.96
Oct. 5	42.43	Apr. 12	33.66		

B2-63-23dc

Date	Water level	Date	Water level	Date	Water level
Apr. 26, 1944	46.89	Feb. 2, 1948	44.95	Mar. 15, 1949	46.75
Nov. 10	47.85	Mar. 11	44.60	Apr. 15	46.29
May 3, 1945	46.65	June 5	44.28	May 9	45.99
Oct. 30	49.32	July 1	45.46	June 16	45.57
Oct. 31, 1946	49.72	Aug. 23	48.04	Aug. 2	47.55
Apr. 29, 1947	47.16	Sept. 13	48.60	Dec. 9	43.78
Sept. 22	47.60	Oct. 5	50.15	Feb. 1, 1950	43.80
Oct. 9	46.61	Nov. 4	49.43	Apr. 5	43.28
Oct. 29	46.73	Dec. 7	48.51	May 23	44.40
Nov. 5	46.63	Jan. 15, 1949	47.66	Oct. 13	48.72
Dec. 8	45.52	Feb. 15	48.18	Dec. 10	47.39
Jan. 9, 1948	45.31				

B2-63-28dd

Date	Water level	Date	Water level	Date	Water level
May 19, 1942	44.29	Apr. 30, 1943	38.83	Nov. 17, 1943	42.63
Sept. 2	44.77	May 3	38.35	Dec. 21	41.68
Oct. 7	41.78	June 3	38.61	Apr. 27, 1944	39.44
Nov. 17	40.69	Oct. 5	44.92	Nov. 9	41.83

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-28dd—Continued

Date	Water level	Date	Water level	Date	Water level
May 3, 1945	39.25	Mar. 11, 1948	35.92	May 9, 1949	36.35
Oct. 31	42.24	Apr. 12	35.47	June 16	35.29
Oct. 31, 1946	44.73	Apr. 23	35.27	Aug. 2	39.72
Apr. 29, 1947	40.18	June 5	38.27	Oct. 18	37.68
Sept. 22	40.92	Oct. 5	42.92	Dec. 9	34.95
Oct. 9	39.97	Nov. 8	40.55	Feb. 1, 1950	33.68
Oct. 29	38.72	Dec. 7	39.33	Apr. 5	33.68
Nov. 5	38.40	Jan. 15, 1949	38.25	Aug. 3	43.61
Dec. 8	37.54	Feb. 15	37.55	Oct. 13	42.79
Jan. 9, 1948	36.91	Mar. 15	37.14	Dec. 10	39.78
Feb. 2	36.44	Apr. 15	36.61		

B2-63-32aa

Date	Water level	Date	Water level	Date	Water level
Apr. 25, 1934	22.71	Aug. 3, 1942	36.52	Mar. 11, 1948	29.70
June 19	23.05	Sept. 2	36.09	Apr. 12	29.60
Oct. 3	24.04	Oct. 8	35.46	Apr. 23	29.09
Apr. 16, 1935	24.83	Nov. 17	34.90	June 5	29.51
Oct. 16	25.68	Apr. 31, 1943	34.23	July 1	29.26
Apr. 23, 1936	26.91	May 3	34.08	Sept. 13	28.57
July 2	27.28	July 7	33.75	Oct. 5	28.32
Sept. 9	27.70	Aug. 5	33.53	Nov. 8	28.17
Nov. 13	27.90	Sept. 2	33.04	Dec. 7	28.03
Apr. 29, 1937	28.88	Oct. 5	32.69	Jan. 15, 1949	28.19
June 11	29.08	Nov. 17	32.57	Feb. 15	28.14
Oct. 30	30.41	Apr. 27, 1944	32.85	Mar. 15	28.69
May 11, 1938	32.02	Nov. 8	31.18	Apr. 15	28.67
Dec. 9	33.36	May 3, 1945	31.25	May 9	28.80
Apr. 26, 1939	33.03	Oct. 31	30.89	June 16	28.51
Oct. 26	33.65	Apr. 24, 1946	31.38	July 12	27.63
Apr. 25	34.65	Oct. 31	31.84	Aug. 2	27.37
Oct. 9	35.20	Apr. 29, 1947	32.06	Oct. 18	25.97
Nov. 30, 1940	35.73	Sept. 22	30.92	Dec. 9	25.79
May 5, 1941	36.20	Oct. 9	30.45	Feb. 1, 1950	26.06
Nov. 4	36.80	Oct. 29	29.79	Apr. 5	26.19
Apr. 16, 1942	37.43	Nov. 5	30.13	May 23	26.23
May 16	37.35	Dec. 8	29.78	Aug. 3	26.45
June 9	37.17	Jan. 9, 1948	29.78	Oct. 13	26.49
July 6	36.85	Feb. 2	29.60	Dec. 10	26.80

B2-63-34cc

Date	Water level	Date	Water level	Date	Water level
May 11, 1938	58.54	Mar. 31, 1943	55.80	Jan. 9, 1948	52.97
Dec. 9	58.99	June 3	55.01	Feb. 2	52.39
Apr. 26, 1939	57.31	Aug. 5	58.65	Mar. 11	51.81
Oct. 26	41.95	Oct. 5	59.41	Apr. 12	50.87
Apr. 25, 1940	59.30	Dec. 21	56.88	Apr. 23	50.66
Nov. 30	64.11	Apr. 27, 1944	55.42	June 5	51.72
May 5, 1941	62.61	Nov. 9	57.52	July 1	53.20
Nov. 4	66.14	May 3, 1945	54.48	Aug. 13	57.70
Apr. 16, 1942	64.05	Oct. 31	59.22	Sept. 13	[99]70.49
May 15	63.64	May 16, 1946	58.30	Oct. 5	57.70
June 8	63.02	Oct. 30	60.75	Nov. 8	55.59
July 7	65.67	Apr. 29, 1947	56.46	Dec. 7	54.28
Aug. 5	60.55	Oct. 9	55.74	Jan. 15, 1949	53.12
Sept. 2	61.81	Oct. 29	54.65	Feb. 15	52.33
Oct. 8	60.17	Nov. 5	54.32	Mar. 15	51.93
Nov. 18	58.62	Dec. 8	53.19	Apr. 15	51.36

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B2-63-34cc—Continued

Date	Water level	Date	Water level	Date	Water level
May 9, 1949	51.19	Dec. 9, 1949	49.82	May 23, 1950	50.48
June 16	51.17	Feb. 1, 1950	48.69	Oct. 13	56.82
July 12	51.23	Apr. 5	47.29	Dec. 10	54.60
Oct. 18	51.85				

B2-63-35dc

Date	Water level	Date	Water level	Date	Water level
Apr. 25, 1934	35.76	Nov. 17, 1942	53.41	Mar. 11, 1948	47.03
Oct. 3	40.77	Apr. 1, 1943	51.10	Apr. 12	46.40
Apr. 16, 1935	39.81	May 4	50.68	Apr. 23	46.20
Oct. 16	43.20	June 1	50.76	July 1	46.49
Apr. 24, 1936	42.55	Oct. 6	53.48	Nov. 8	48.69
Sept. 9	48.25	Nov. 17	52.31	Dec. 7	47.94
Nov. 12	47.39	Apr. 26, 1944	50.21	Jan. 15, 1949	47.15
Apr. 29, 1937	46.22	Nov. 9	51.33	Feb. 15	46.85
June 11	48.03	May 3, 1945	48.95	Mar. 15	46.50
Oct. 29	51.70	Oct. 31	50.80	Apr. 15	46.32
May 11, 1938	50.02	Apr. 23, 1946	48.94	May 9	45.93
Dec. 9	52.00	Oct. 31	50.74	June 16	45.31
Apr. 26, 1939	50.54	Apr. 29, 1947	48.83	July 12	45.06
Oct. 26	55.40	Oct. 9	50.75	Oct. 18	45.16
Apr. 25, 1940	52.40	Oct. 28	48.95	Dec. 9	44.28
Nov. 30	54.75	Nov. 5	48.76	Feb. 1, 1950	43.55
May 5, 1941	53.60	Dec. 8	48.02	Apr. 5	43.25
Nov. 4	56.73	Jan. 9, 1948	47.65	Oct. 13	47.05
May 16, 1942	54.37	Feb. 2	47.29	Dec. 10	45.98
Oct. 6	54.75				

B2-63-36bc

Date	Water level	Date	Water level	Date	Water level
Apr. 29, 1937	41.27	June 1, 1943	51.00	Apr. 12, 1948	46.30
June 11	45.37	Sept. 3	56.01	Apr. 23	45.92
Oct. 29	47.98	Oct. 6	54.17	June 5	46.60
May 11, 1938	45.78	Nov. 16	52.65	July 1	46.74
Dec. 9	47.81	Apr. 26, 1944	50.75	Oct. 5	50.14
Apr. 26, 1939	46.76	Nov. 9	51.63	Nov. 8	48.98
Oct. 26	50.57	May 3, 1945	49.40	Dec. 7	48.46
Apr. 25, 1940	49.28	Oct. 30	51.45	Jan. 15, 1949	47.75
Nov. 30	52.93	Apr. 23, 1946	50.50	Feb. 15	47.36
May 5, 1941	52.06	Oct. 31	50.50	Mar. 15	47.07
Nov. 4	54.65	Apr. 29, 1947	48.55	Apr. 15	46.62
Apr. 16, 1942	53.60	Sept. 22	50.88	May 9	46.37
May 20	53.35	Oct. 9	49.94	June 16	45.79
June 9	53.22	Oct. 29	49.10	Oct. 18	47.32
July 7	52.93	Nov. 5	49.02	Dec. 9	45.45
Oct. 7	53.48	Dec. 8	48.49	Feb. 1, 1950	44.34
Nov. 17	52.65	Jan. 9, 1948	47.85	Apr. 5	43.36
Apr. 1, 1943	50.95	Feb. 2	47.42	Oct. 13	48.45
May 4	51.20	Mar. 11	47.00	Dec. 10	46.85

B3-61-14bd

Date	Water level	Date	Water level	Date	Water level
Apr. 20, 1947	57.25	Mar. 10, 1948	53.52	Oct. 4, 1948	53.39
Sept. 22	53.35	Apr. 12	53.42	Nov. 8	53.54
Oct. 3	53.50	June 3	53.37	Dec. 6	53.87
Nov. 4	55.04	July 1	53.40	Jan. 14, 1949	53.31
Dec. 4	54.20	Aug. 5	53.44	Mar. 11	53.70
Jan. 7, 1948	53.40	Sept. 13	53.59	Apr. 14	53.64

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B3-61-14bd—Continued

Date	Water level	Date	Water level	Date	Water level
May 4, 1949	53.43	Oct. 18, 1949	53.52	May 23, 1950	53.10
June 7	53.56	Dec. 9	52.43	Aug. 3	52.53
July 17	53.94	Feb. 3, 1950	53.69	Oct. 14	53.55
Aug. 2	53.59	Apr. 5	53.60	Dec. 10	53.68

B3-61-36bc

Date	Water level	Date	Water level	Date	Water level
Dec. 23, 1947	35.30	Oct. 4, 1948	39.92	June 6, 1949	34.81
Feb. 3, 1948	35.30	Nov. 4	36.90	Oct. 17	37.73
Mar. 10	34.95	Dec. 7	36.33	Dec. 7	35.80
Apr. 12	34.87	Jan. 15, 1949	35.42	Feb. 1, 1950	34.75
June 4	34.87	Feb. 13	35.55	Apr. 10	34.78
June 30	36.08	Mar. 15	35.39	May 23	36.39
Aug. 18	37.49	Apr. 15	35.34	Oct. 14	38.51
Sept. 1	38.37	May 9	34.88	Dec. 9	36.89

B4-61-1bb1

Date	Water level	Date	Water level	Date	Water level
Sept. 15, 1947	7.50	Aug. 11, 1948	6.09	Aug. 1, 1949	5.70
Oct. 9	7.00	Sept. 9	7.25	Oct. 14	6.52
Nov. 3	7.52	Oct. 1	6.78	Dec. 8	7.27
Dec. 6	7.67	Nov. 5	7.53	Feb. 3, 1950	7.90
Jan. 6, 1948	7.81	Dec. 6	7.75	Apr. 10	7.78
Feb. 4	8.04	Mar. 11, 1949	7.65	May 24	7.98
Mar. 2	7.73	Apr. 6	6.90	Aug. 3	6.94
Apr. 15	7.75	May 4	7.02	Oct. 17	8.72
June 3	6.98	July 13	5.85	Dec. 15	9.15
July 7	6.45				

B4-61-28bb

Date	Water level	Date	Water level	Date	Water level
Sept. 18, 1947	22.45	Aug. 11, 1948	[rr]44.70	June 1, 1949	29.76
Oct. 9	21.60	Sept. 9	23.75	July 4	25.75
Nov. 6	23.73	Oct. 5	23.13	Aug. 1	24.97
Dec. 6	26.22	Nov. 5	23.92	Oct. 14	21.65
Jan. 7, 1948	28.64	Dec. 7	26.50	Dec. 8	26.62
Feb. 3	30.22	Jan. 16, 1949	29.20	Feb. 2, 1950	30.27
Mar. 2	30.30	Feb. 15	30.78	Apr. 5	30.78
Apr. 15	32.17	Mar. 11	31.97	May 24	28.84
June 5	29.32	Apr. 18	32.87	Oct. 17	23.92
July 1	23.94	May 2	32.22	Dec. 15	27.14

B4-61-30ab

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	28.05	Sept. 9, 1948	28.15	July 4, 1949	27.82
Oct. 9	28.00	Oct. 5	28.15	Aug. 2	26.89
Nov. 6	28.36	Nov. 5	28.32	Oct. 14	26.66
Dec. 6	29.[illegible]3	Dec. 7	29.62	Dec. 8	28.52
Jan. 7, 1948	29.95	Jan. 16, 1949	30.53	Feb. 2, 1950	29.95
Feb. 3	30.40	Feb. 15	30.90	Apr. 5	27.46
Mar. 2	29.97	Mar. 11	31.33	May 24	27.24
Apr. 15	29.85	Apr. 18	31.94	Aug. 2	27.15
July 1	28.94	May 2	29.80	Oct. 17	26.39
Aug. 11	28.11	June 1	28.45	Dec. 15	28.82

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B4-62-20bd

Date	Water level	Date	Water level	Date	Water level
Sept. 20, 1947	20.90	Oct. 9, 1947	20.65	Nov. 6, 1947	[d]20.50

B4-63-2cb

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	1.45	Sept. 9, 1948	3.20	July 4, 1949	1.50
Oct. 9	2.24	Oct. 5	2.59	Aug. 1	4.73
Nov. 6	2.07	Nov. 5	2.61	Oct. 14	.97
Dec. 6	2.12	Dec. 7	2.78	Dec. 8	2.67
Jan. 7, 1948	2.26	Jan. 16, 1949	2.05	Feb. 2, 1950	3.02
Jan. 30	2.52	Feb. 15	1.80	Apr. 5	3.35
Mar. 2	1.53	Mar. 11	1.57	May 24	3.82
Apr. 15	2.20	Apr. 18	2.19	Aug. 2	4.03
June 5	1.76	May 2	2.32	Oct. 17	2.14
July 1	1.79	June 1	2.13	Dec. 15	2.84
Aug. 11	3.61				

B4-63-4ab

Date	Water level	Date	Water level	Date	Water level
Sept. 19, 1947	31.70	Aug. 11, 1948	[ss]46.00	June 1, 1949	32.12
Oct. 9	31.50	Sept. 9	31.75	July 4	31.97
Nov. 6	31.74	Oct. 5	32.02	Aug. 1	30.75
Dec. 6	31.44	Nov. 5	31.61	Oct. 14	29.03
Jan. 7, 1948	31.94	Dec. 7	32.18	Dec. 8	31.04
Jan. 30	32.18	Jan. 16, 1949	31.65	Feb. 2, 1950	31.55
Mar. 2	31.91	Feb. 15	31.02	Apr. 5	32.39
Apr. 15	32.30	Mar. 11	31.28	May 24	33.99
June 5	32.68	Apr. 18	31.47	Oct. 17	26.62
July 1	32.24	May 2	32.42	Dec. 15	32.70

B5-63-32bc

Date	Water level	Date	Water level	Date	Water level
Sept. 20, 1947	27.71	Sept. 9, 1948	27.64	July 4, 1949	27.60
Oct. 9	27.38	Oct. 5	27.74	Aug. 1	27.00
Nov. 6	28.10	Nov. 5	28.18	Oct. 14	26.64
Dec. 6	27.76	Dec. 7	28.97	Dec. 8	28.00
Jan. 7, 1948	29.33	Jan. 16, 1949	29.51	Feb. 2, 1950	28.59
Jan. 30	29.25	Feb. 15	29.62	Apr. 5	30.19
Mar. 2	30.14	Mar. 11	29.68	May 24	30.20
Apr. 15	30.40	Apr. 18	30.09	Aug. 2	29.02
June 5	29.69	May 2	30.25	Oct. 17	28.44
July 1	29.04	June 1	28.93	Dec. 15	29.28
Aug. 11	28.59				

DEUEL COUNTY, NEBR.

B12-42-9cc

Date	Water level	Date	Water level	Date	Water level
Sept. 17, 1947	31.95	Aug. 4, 1948	30.59	May 5, 1949	32.15
Oct. 7	30.94	Sept. 13	31.28	June 8	31.60
Nov. 6	31.70	Oct. 8	31.68	July 5	31.10
Dec. 14	32.04	Nov. 8	31.82	Aug. 11	31.11
Jan. 3, 1948	32.26	Nov. 29	32.00	Oct. 6	30.35
Feb. 9	32.49	Jan. 21, 1949	32.36	Dec. 13	31.42
Mar. 15	32.80	Feb. 9	32.42	Feb. 9, 1950	31.96
Apr. 19	32.35	Mar. 4	32.22	Apr. 13	31.86
July 8	30.62	Apr. 12	32.05	June 1	[a]31.10

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

Date	Water level	Date	Water level	Date	Water level
DEUEL COUNTY, NEBR.—Continued					
B12-43-21ab					
Sept. 17, 1947	6.30	Mar. 16, 1948	5.76	Nov. 8, 1948	6.22
Oct. 7	6.11	Apr. 19	6.15	Nov. 29	6.17
Nov. 5	5.84	June 8	6.09	Jan. 21, 1949	5.71
Dec. 13	6.08	July 9	5.79	Feb. 9	5.75
Jan. 4, 1948	6.12	Sept. 14	6.04	Mar. 5	5.75
Feb. 10	6.00	Oct. 9	6.13	Apr. 12	[a]6.50
B12-43-24bb					
Sept. 17, 1947	23.08	Aug. 4, 1948	23.03	May 5, 1949	22.20
Oct. 7	23.05	Sept. 13	23.55	June 8	22.50
Nov. 6	23.22	Oct. 8	23.43	Oct. 6	22.78
Dec. 14	22.48	Nov. 8	23.13	Dec. 13	22.65
Jan. 3, 1948	22.29	Nov. 29	22.87	Feb. 9, 1950	22.30
Feb. 9	22.20	Jan. 21, 1949	22.30	Apr. 13	22.55
Mar. 15	21.82	Feb. 9	22.13	Aug. 9	23.38
Apr. 19	21.50	Mar. 2	21.93	Oct. 19	23.37
June 8	22.98	Apr. 12	22.35	Dec. 1	23.02
July 8	22.52				
B13-41-31cd1					
Sept. 17, 1947	9.88	Sept. 13, 1948	10.08	July 5, 1949	7.55
Oct. 12	9.36	Oct. 8	8.97	Aug. 12	11.03
Nov. 6	8.70	Nov. 8	8.52	Oct. 6	9.35
Dec. 14	8.24	Nov. 29	8.17	Dec. 13	8.22
Jan. 3, 1948	8.03	Jan. 21, 1949	7.87	Feb. 9, 1950	7.79
Feb. 9	7.85	Feb. 9	7.74	Apr. 13	7.72
Mar. 15	7.45	Mar. 4	7.06	June 1	8.39
Apr. 19	7.70	Apr. 12	6.19	Aug. 9	7.90
June 8	9.54	May 5	7.19	Oct. 19	8.38
July 8	8.96	June 8	6.87	Dec. 1	8.05
Aug. 4	9.99				
B13-42-35cc					
Oct. 1, 1947	7.52	Jan. 4, 1948	6.05	Mar. 15, 1948	5.08
Nov. 5	5.35	Feb. 10	6.00	June 8	[tt]7.46
Dec. 13	6.22				
B13-42-36cb					
Nov. 5, 1947	6.31	Nov. 8, 1948	5.52	June 8, 1949	4.89
Dec. 13	4.69	Nov. 29	5.08	July 7	3.45
Jan. 4, 1948	4.63	Jan. 21, 1949	5.85	Oct. 7	5.48
Feb. 10	3.51	Feb. 9	4.15	Feb. 9, 1950	4.29
Mar. 15	2.29	Mar. 5	3.74	Apr. 14	4.63
Apr. 19	3.80	Apr. 12	3.34	Aug. 8	6.30
Sept. 14	6.43	May 5	4.48	Dec. 2	5.39
Oct. 9	5.77				
KEITH COUNTY, NEBR.					
B13-35-6dd1					
Dec. 31, 1938	7.72	Mar. 1, 1939	7.09	May 3, 1939	6.78
Feb. 5, 1939	7.31	Apr. 7	6.70	June 3	7.31

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-35-6dd1—Continued

Date	Water level	Date	Water level	Date	Water level
July 6, 1939	7.66	Oct. 1, 1941	9.26	Sept. 16, 1944	8.42
Aug. 2	8.19	Oct. 22	9.09	Oct. 9	8.71
Sept. 1	8.58	Nov. 4	9.00	Jan. 10, 1945	8.61
Oct. 4	8.89	Dec. 1	8.83	Feb. 13	8.46
Nov. 6	9.03	Feb. 2, 1942	8.30	Mar. 10	8.40
Dec. 4	9.05	Mar. 2	8.12	Apr. 12	8.39
Jan. 2, 1940	9.07	Apr. 7	7.53	Aug. 2	8.45
Jan. 31	8.77	May 8	5.90	Oct. 19	8.41
Mar. 5	8.45	Aug. 8	7.49	Dec. 3	8.27
Apr. 2	8.30	Sept. 7	8.08	Jan. 31, 1946	7.68
May 27	8.53	Oct. 5	8.49	Apr. 15	7.60
June 28	8.35	Nov. 13	8.57	May 8	7.74
July 26	8.72	Dec. 15	8.55	June 4	7.82
Aug. 30	9.07	Jan. 28, 1943	8.18	July 18	8.30
Sept. 27	9.21	Mar. 19	7.96	Aug. 6	8.40
Oct. 30	9.24	May 18	8.01	Nov. 23	8.00
Nov. 6	9.23	June 12	7.99	July 9, 1948	8.90
Dec. 2	9.17	July 9	7.79	Aug. 5	9.22
Dec. 30	8.99	Aug. 2	7.54	Sept. 13	9.14
Feb. 3, 1941	8.85	Sept. 15	8.60	Oct. 9	9.21
Feb. 28	8.77	Oct. 4	8.81	Nov. 8	9.29
Apr. 12	8.29	Nov. 6	9.03	Dec. 2	9.17
May 6	8.60	Dec. 9	8.99	Feb. 9, 1949	9.24
June 6	8.75	Jan. 15, 1944	8.26	Mar. 4	8.73
July 1	8.75	June 8	7.44	Apr. 12	9.61
Aug. 5	8.91	July 12	7.95	May 5	[uu]7.49
Sept. 3	9.11	Aug. 11	8.34		

B13-35-6dd2

Date	Water level	Date	Water level	Date	Water level
July 20, 1949	[vv]10.34	Feb. 9, 1950	12.23	Aug. 9, 1950	11.94
Aug. 12	11.02	Apr. 13	12.32	Oct. 20	12.29
Oct. 6	11.56	June 1	12.07	Dec. 2	12.52
Dec. 13	11.98				

B13-36-3cb

Date	Water level	Date	Water level	Date	Water level
Oct. 3, 1938	8.30	June 28, 1940	9.24	Aug. 12, 1942	8.36
Nov. 4	9.02	July 26	9.79	Sept. 10	8.51
Dec. 3	8.92	Aug. 30	10.16	Oct. 8	8.31
Dec. 31	8.12	Sept. 27	10.25	Nov. 13	8.02
Feb. 5, 1939	7.13	Oct. 30	10.06	Dec. 15	7.93
Mar. 1	7.02	Dec. 30	9.24	Jan. 28, 1943	7.38
Apr. 7	7.06	Feb. 3, 1941	9.15	Mar. 19	7.69
May 3	7.50	Feb. 28	8.94	May 18	8.61
June 3	8.70	Apr. 12	9.21	June 12	7.79
July 6	9.17	May 7	8.70	July 9	8.53
Aug. 2	9.70	June 6	9.30	Aug. 2	8.98
Sept. 1	9.98	July 1	9.17	Sept. 15	9.68
Oct. 4	10.12	Aug. 5	9.64	Oct. 6	9.82
Nov. 6	10.02	Sept. 2	9.94	Nov. 6	9.19
Dec. 4	9.97	Oct. 1	9.82	Dec. 9	9.03
Jan. 2, 1940	9.79	Nov. 4	9.23	Jan. 15, 1944	8.03
Jan. 31	9.10	Dec. 4	8.78	June 8	8.31
Mar. 5	8.77	Feb. 2, 1942	8.45	July 12	8.80
Apr. 2	8.77	Mar. 2	8.27	Aug. 11	9.26
May 1	9.22	Apr. 7	7.76	Sept. 16	9.51
May 27	9.22	May 8	4.61	Oct. 9	9.71

See footnotes at end of table.

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Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-3cb—Continued

Date	Water level	Date	Water level	Date	Water level
Jan. 10, 1945	8.93	Aug. 6, 1946	9.70	Apr. 12, 1949	9.04
Feb. 13	8.52	Nov. 23	9.10	May 5	8.98
Mar. 10	8.49	June 25, 1947	7.70	June 8	9.33
Apr. 12	8.63	Dec. 3	10.10	July 7	7.33
Aug. 2	9.17	July 9, 1948	10.01	Aug. 12	8.91
Oct. 19	8.43	Aug. 5	10.10	Oct. 6	9.15
Dec. 3	8.30	Sept. 13	10.04	Dec. 13	9.08
Jan. 31, 1946	8.33	Oct. 9	10.03	Feb. 9, 1950	9.81
Apr. 15	8.30	Nov. 8	9.99	Apr. 13	9.56
May 8	8.82	Dec. 2	9.82	June 1	9.37
June 4	8.98	Feb. 9, 1949	9.53	Aug. 9	9.67
July 18	9.48	Mar. 4	8.97	Oct. 20	9.30

B13-36-5db

Date	Water level	Date	Water level	Date	Water level
Nov. 6, 1947	22.10	Feb. 10, 1948	22.35	June 8, 1948	21.76
Dec. 13	21.96	Mar. 15	21.98	July 9	[ww]23.58
Jan. 4, 1948	21.50	Apr. 19	22.77	Oct. 9	22.63

B13-36-6bc

Date	Water level	Date	Water level	Date	Water level
Dec. 2, 1936	5.58	May 1, 1940	5.38	Dec. 9, 1943	5.86
Jan. 4, 1937	5.36	May 27	5.53	Jan. 15, 1944	5.23
Feb. 2	4.64	June 28	5.54	June 8	5.04
Mar. 3	4.42	July 26	5.85	July 12	5.48
Apr. 1	4.68	Aug. 30	6.09	Aug. 11	5.78
May 5	5.34	Sept. 27	6.16	Sept. 16	6.04
June 3	5.46	Oct. 30	5.99	Oct. 9	6.10
July 6	5.68	Dec. 30	5.43	Jan. 10, 1945	5.24
Aug. 2	5.93	Feb. 3, 1941	5.33	Feb. 13	5.06
Nov. 2	5.89	Feb. 28	5.12	Mar. 10	5.08
Dec. 3	5.54	Apr. 12	5.38	Apr. 12	5.28
Dec. 31	6.15	May 7	5.25	Aug. 2	5.59
Feb. 2, 1938	3.90	June 6	5.45	Oct. 19	4.76
Mar. 2	4.58	July 1	5.39	Dec. 3	4.60
Apr. 2	5.30	Aug. 4	5.58	Jan. 31, 1946	4.11
May 6	4.92	Sept. 2	5.95	Apr. 15	4.49
June 2	4.44	Oct. 1	5.85	May 8	4.97
July 2	4.95	Nov. 4	5.34	June 4	5.10
Sept. 1	5.78	Dec. 1	4.94	July 18	5.71
Oct. 3	4.72	Feb. 2, 1942	4.45	Aug. 6	5.90
Nov. 4	4.91	Mar. 2	4.20	Nov. 23	4.80
Dec. 3	4.72	Apr. 7	4.18	June 25, 1947	2.80
Dec. 31	4.40	May 8	2.03	Dec. 3	4.50
Feb. 5, 1939	3.92	Aug. 12	5.61	July 9, 1948	3.91
Mar. 1	3.60	Sept. 10	5.73	Aug. 5	4.60
Apr. 5	3.28	Oct. 8	5.70	Sept. 13	5.36
May 4	4.00	Nov. 13	5.27	Oct. 9	5.33
June 3	4.87	Dec. 15	5.08	Nov. 8	4.92
July 6	5.39	Jan. 28, 1943	4.10	Dec. 2	4.11
Aug. 2	5.75	Mar. 19	4.39	Feb. 9, 1949	2.96
Sept. 1	5.97	May 18	5.38	Mar. 4	3.74
Oct. 4	5.92	June 12	4.44	Apr. 12	3.32
Dec. 4	5.68	July 9	5.40	May 5	4.23
Jan. 2, 1940	5.56	Aug. 2	5.86	June 8	3.57
Jan. 31	5.15	Sept. 15	6.26	July 7	2.69
Mar. 5	4.89	Oct. 6	6.32	Aug. 12	5.32
Apr. 2	4.94	Nov. 6	6.06	Oct. 6	5.27

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-6bc—Continued

Date	Water level	Date	Water level	Date	Water level
Dec. 13, 1949	4.39	June 1, 1950	5.12	Oct. 20, 1950	4.80
Feb. 9, 1950	3.68	Aug. 9	4.65	Dec. 2	4.27
Apr. 13	4.27				

B13-36-8cc

[Weekly readings taken from daily recorder data]

Date	Water level	Date	Water level	Date	Water level
Feb. 7, 1946	3.78	Feb. 14, 1947	3.83	Feb. 16, 1948	3.43
Feb. 14	3.91	Feb. 21	3.54	Feb. 24	2.95
Feb. 21	4.04	Feb. 28	3.75	Mar. 2	2.94
Feb. 28	4.10	Mar. 7	3.70	Mar. 9	2.72
Mar. 7	4.14	Mar. 14	3.63	Mar. 18	2.46
Mar. 14	3.98	Mar. 21	3.72	Mar. 25	2.73
Mar. 21	3.79	Mar. 28	3.44	Apr. 16	2.96
Mar. 28	3.69	Apr. 4	3.30	Apr. 23	3.20
Apr. 4	3.91	Apr. 11	3.24	May 3	3.57
Apr. 11	3.90	Apr. 18	3.46	May 10	3.47
Apr. 18	4.05	Apr. 25	3.75	May 17	3.72
Apr. 25	4.30	May 2	4.03	May 24	4.06
May 2	4.36	May 9	4.24	May 31	4.17
May 9	4.45	May 16	4.41	June 7	3.55
May 16	4.55	May 23	4.48	June 14	3.95
May 23	4.68	June 2	3.64	June 21	3.73
May 30	4.58	June 9	3.13	June 28	3.24
June 6	4.57	June 16	2.99	July 5	3.65
June 13	4.89	June 23	2.62	July 12	3.92
June 20	5.09	June 30	2.48	July 19	4.01
June 27	5.25	July 1	2.44	July 26	4.27
July 4	5.41	July 8	2.76	Aug. 2	4.44
Juyy 11	5.44	July 15	3.03	Aug. 9	4.50
July 18	5.52	July 22	3.18	Aug. 16	4.66
July 25	5.60	July 29	3.08	Aug. 23	4.85
Aug. 2	5.67	Aug. 5	3.57	Aug. 30	4.81
Aug. 13	5.75	Aug. 12	4.04	Sept. 6	4.91
Aug. 20	5.79	Aug. 19	4.12	Sept. 13	4.86
Aug. 27	5.53	Aug. 25	4.46	Sept. 20	4.96
Sept. 3	5.49	Sept. 2	4.71	Sept. 27	4.97
Sept. 10	5.20	Sept. 9	4.85	Oct. 4	4.91
Sept. 17	4.91	Sept. 15	4.72	Oct. 11	4.71
Sept. 26	4.99	Sept. 29	4.65	Oct. 18	4.18
Oct. 3	5.07	Oct. 6	4.72	Oct. 25	4.14
Oct. 10	4.90	Oct. 13	4.63	Nov. 1	4.02
Oct. 17	4.81	Oct. 20	4.46	Nov. 8	3.90
Oct. 24	4.75	Oct. 27	3.74	Nov. 15	3.85
Oct. 31	4.74	Nov. 3	3.67	Nov. 22	3.71
Nov. 7	4.69	Nov. 10	3.70	Nov. 29	3.66
Nov. 14	4.65	Nov. 17	3.63	Dec. 6	3.60
Nov. 21	4.34	Nov. 24	3.50	Dec. 13	3.59
Nov. 28	4.23	Dec. 1	3.49	Dec. 20	3.62
Dec. 5	4.12	Dec. 8	3.31	Dec. 27	3.66
Dec. 12	4.09	Dec. 15	3.30	Feb. 9, 1949	3.12
Dec. 19	4.00	Dec. 22	3.25	Feb. 16	3.01
Dec. 26	3.86	Dec. 29	3.29	Feb. 23	2.40
Jan. 3, 1947	4.17	Jan. 5, 1948	3.32	Mar. 3	2.44
Jan. 10	3.91	Jan. 12	3.30	Mar. 10	2.76
Jan. 17	3.98	Jan. 19	3.38	Mar. 17	2.84
Jan. 24	3.94	Jan. 26	3.24	Mar. 24	2.94
Jan. 31	3.85	Feb. 2	3.44	May 3	3.12
Feb. 7	3.71	Feb. 9	3.33	May 10	2.29

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-8cc—Continued

Date	Water level	Date	Water level	Date	Water level
May 17, 1949	2.40	Aug. 10, 1949	4.04	Nov. 4, 1949	3.46
May 24	2.25	Aug. 17	4.18	Nov. 11	3.42
May 31	2.84	Aug. 24	4.32	Nov. 18	3.40
June 7	2.48	Aug. 31	4.35	Nov. 25	3.34
June 14	1.66	Sept. 8	4.20	Dec. 12	3.35
June 21	2.07	Sept. 15	4.19	Jan. 5, 1950	3.50
June 28	2.42	Sept. 22	4.25	Jan. 18	3.44
July 6	2.81	Sept. 29	4.22	Jan. 30	3.42
July 13	3.02	Oct. 6	3.92	Feb. 6	3.30
July 20	3.33	Oct. 13	3.82	Feb. 13	3.08
July 27	3.68	Oct. 20	3.63	Feb. 21	2.98
Aug. 3	3.73	Oct. 27	3.50		

B13-36-9ad

[Weekly readings taken from daily recorder data]

Date	Water level	Date	Water level	Date	Water level
Feb. 7, 1946	0.86	Dec. 2, 1946	2.08	Sept. 23, 1947	2.86
Feb. 14	.86	Dec. 9	1.95	Sept. 30	2.85
Feb. 21	.59	Dec. 16	1.87	Oct. 8	2.86
Feb. 28	.72	Dec. 23	1.83	Oct. 15	2.62
Mar. 4	.83	Dec. 30	1.84	Oct. 22	2.59
Mar. 11	.24	Jan. 6, 1947	1.88	Oct. 30	2.25
Mar. 18	.18	Jan. 13	1.67	Nov. 6	2.12
Mar. 25	.56	Jan. 20	1.73	Nov. 13	1.94
Apr. 1	.89	Jan. 27	1.52	Nov. 20	1.81
Apr. 8	1.03	Feb. 3	1.45	Nov. 27	1.71
Apr. 15	.97	Feb. 10	1.60	Dec. 4	1.67
Apr. 22	1.47	Feb. 17	1.30	Dec. 11	1.63
Apr. 29	1.85	Feb. 24	1.21	Dec. 18	1.61
May 6	.90	Mar. 4	1.40	Dec. 25	1.30
May 13	1.54	Mar. 11	1.18	Jan. 1, 1948	1.35
May 20	1.95	Mar. 18	1.03	Jan. 8	1.28
May 27	1.52	Mar. 25	.98	Jan. 15	1.36
June 3	1.35	Mar. 31	.96	Jan. 22	1.46
June 10	2.20	Apr. 8	.42	Jan. 29	1.61
June 17	2.60	Apr. 15	.84	Feb. 9	1.63
June 24	2.56	Apr. 22	1.12	Feb. 16	1.73
July 1	2.91	Apr. 29	1.22	Feb. 24	1.06
July 8	3.01	May 8	1.67	Mar. 2	.70
July 15	3.20	May 15	1.80	Mar. 9	.67
July 22	3.38	May 22	2.03	Mar. 18	.18
July 29	3.39	May 29	2.11	Mar. 25	.47
Aug. 5	3.60	June 5	1.44	Apr. 16	1.17
Aug. 13	3.55	June 12	.55	Apr. 22	1.28
Aug. 20	3.74	June 19	1.15	May 3	1.46
Aug. 27	3.33	June 26	1.18	May 10	1.63
Sept. 3	3.03	July 3	1.06	May 17	1.92
Sept. 10	2.93	July 10	1.41	May 24	2.35
Sept. 17	2.94	July 17	1.50	May 31	2.28
Sept. 26	2.93	July 24	1.39	June 7	2.23
Oct. 3	2.97	July 31	1.88	June 14	2.59
Oct. 10	2.77	Aug. 6	2.29	June 21	2.33
Oct. 21	2.75	Aug. 13	2.60	June 28	1.94
Oct. 28	2.75	Aug. 20	2.73	July 5	2.46
Nov. 4	2.73	Aug. 27	2.95	July 16	2.32
Nov. 11	2.60	Sept. 3	3.08	July 23	2.66
Nov. 18	2.28	Sept. 9	3.14	July 30	2.92
Nov. 25	2.16	Sept. 16	2.81	Aug. 6	2.88

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-9ad—Continued

Date	Water level	Date	Water level	Date	Water level
Aug. 13, 1948	3.16	Feb. 22, 1949	0.28	Aug. 17, 1949	2.87
Aug. 20	3.37	Feb. 28	.10	Aug. 24	2.94
Aug. 27	3.27	Mar. 7	.39	Aug. 31	2.83
Sept. 3	3.39	Mar. 17	.52	Sept. 8	2.64
Sept. 10	3.16	Mar. 24	.58	Sept. 15	2.57
Sept. 17	3.25	May 3	1.17	Sept. 22	2.64
Sept. 24	3.26	May 10	.64	Sept. 29	2.67
Oct. 4	3.18	May 17	.18	Oct. 6	2.36
Oct. 11	3.08	May 24	.30	Oct. 13	2.36
Oct. 18	2.76	May 31	1.05	Oct. 20	2.31
Oct. 25	2.66	June 6	.24	Oct. 27	2.07
Nov. 1	2.57	June 14	.14	Nov. 3	2.00
Nov. 8	2.52	June 21	1.02	Nov. 10	1.89
Nov. 15	2.50	June 28	1.31	Nov. 17	1.75
Nov. 22	2.31	July 6	1.35	Nov. 24	1.68
Nov. 29	2.19	July 13	1.48	Dec. 12	1.60
Dec. 6	2.18	July 20	1.88	Jan. 5, 1950	1.98
Dec. 13	2.09	July 27	2.34	Jan. 18	1.60
Dec. 20	2.07	Aug. 3	2.59	Jan. 30	1.17
Jan. 1, 1949	1.84	Aug. 10	2.84		

B13-36-20ad

Date	Water level	Date	Water level	Date	Water level
Nov. 6, 1947	96.30	Sept. 13, 1948	91.40	Dec. 13, 1949	84.55
Dec. 14	92.20	Oct. 9	92.45	Feb. 9, 1950	92.75
Jan. 3, 1948	93.24	Nov. 8	93.20	Apr. 13	93.96
Feb. 10	94.40	Feb. 9, 1949	94.30	June 1	94.36
Mar. 15	95.19	Mar. 4	92.27	Aug. 9	92.14
Apr. 19	94.80	Apr. 12	92.85	Oct. 19	92.30
June 8	92.23	May 5	93.32	Dec. 1	92.05
July 8	93.55				

B13-37-3ab

Date	Water level	Date	Water level	Date	Water level
Aug. 15, 1935	13.80	Nov. 17, 1940	15.31	July 9, 1943	13.03
Aug. 26	14.02	Dec. 2	15.08	Sept. 15	14.61
Sept. 4	14.12	Dec. 30	14.95	Jan. 15, 1944	13.91
Sept. 16	14.26	Feb. 3, 1941	14.79	Nov. 18	14.65
Sept. 23	14.35	Feb. 28	14.65	July 12	13.68
Oct. 7	14.51	May 7	14.42	Aug. 11	13.75
Oct. 25	14.59	June 6	14.61	Oct. 9	14.62
Jan. 1, 1936	14.19	July 1	14.54	Jan. 10, 1945	14.30
Jan. 21	13.86	Aug. 4	13.14	Feb. 13	13.86
Mar. 30	13.92	Sept. 2	13.24	Mar. 10	13.77
Aug. 6	14.85	Oct. 1	14.49	Apr. 12	13.96
Sept. 17	14.98	Oct. 22	13.76	Jan. 31, 1946	12.68
Apr. 5, 1937	13.95	Nov. 18	13.84	Apr. 15	12.96
June 23	14.53	Dec. 1	14.45	May 8	13.24
Aug. 11	14.99	Feb. 2, 1942	13.60	June 4	13.00
June 26, 1938	12.52	Mar. 2	13.50	July 18	13.83
Oct. 26	13.67	Apr. 7	12.63	Aug. 6	15.55
June 12, 1939	13.13	May 8	10.55	Nov. 23	14.00
Dec. 5	15.12	Aug. 12	13.09	Oct. 2, 1947	15.43
May 27, 1940	14.32	Sept. 10	13.42	Nov. 6	15.80
June 28	14.34	Oct. 8	13.94	Dec. 13	14.95
July 26	15.62	Nov. 13	13.88	Jan. 4, 1948	15.04
Aug 30	15.01	Dec. 15	13.90	Mar. 15	12.23
Sept. 27	15.19	Jan. 28, 1943	12.56	Apr. 19	13.90
Oct. 30	15.22	Mar. 19	12.56	June 8	14.12

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-37-3ab—Continued

Date	Water level	Date	Water level	Date	Water level
July 9, 1948	14.40	Dec. 2, 1948	14.86	July 7, 1949	12.14
Aug. 5	15.43	Mar. 4, 1949	13.40	Aug. 12	13.58
Sept. 13	15.39	Apr. 12	13.96	Oct. 6	14.60
Oct. 9	15.12	May 5	13.79	Dec. 13	[xx]13.94
Nov. 8	15.09	June 8	13.96		

B13-37-5ad

Date	Water level	Date	Water level	Date	Water level
Dec. 2, 1936	12.86	July 26, 1940	13.09	Aug. 8, 1944	12.34
Jan. 4, 1937	12.57	Aug. 30	13.26	Sept. 16	12.67
Feb. 2	11.98	Sept. 27	13.37	Oct. 9	12.73
Mar. 3	11.60	Oct. 30	13.17	Jan. 10, 1945	12.12
Apr. 1	12.07	Nov. 29	12.94	Feb. 13	11.97
May 5	12.64	Dec. 30	12.83	Mar. 10	12.97
June 3	12.78	Feb. 3, 1941	12.75	Apr. 12	12.11
July 6	12.97	Feb. 28	12.53	Aug. 2	12.71
Aug. 2	12.92	Apr. 12	12.80	Oct. 19	12.00
Nov. 2	12.82	May 6	12.70	Dec. 3	11.86
Dec. 3	12.64	June 6	12.90	Jan. 31, 1946	11.28
Dec. 31	12.39	July 1	12.75	Apr. 15	11.57
Feb. 2, 1938	12.36	Aug. 4	12.87	May 8	11.89
Mar. 2	12.01	Sept. 2	13.02	June 4	12.00
Apr. 2	12.58	Oct. 1	12.95	July 18	12.27
May 6	12.42	Nov. 4	12.51	Aug. 6	13.00
June 2	12.00	Dec. 1	13.06	Nov. 23	12.00
July 2	11.97	Feb. 2, 1942	11.60	June 25, 1947	9.70
Sept. 1	12.52	Mar. 2	12.06	Dec. 3	11.80
Oct. 3	11.56	Apr. 7	11.09	July 9, 1948	11.85
Nov. 4	12.28	May 8	8.04	Aug. 5	12.18
Dec. 1	12.25	Aug. 12	11.98	Sept. 13	12.48
Dec. 31	11.78	Sept. 10	12.22	Oct. 9	13.06
Feb. 2, 1939	10.97	Oct. 8	12.17	Nov. 8	12.39
Mar 1	10.60	Nov. 13	11.95	Dec. 2	12.10
Apr. 5	10.35	Dec. 15	11.85	Mar. 4, 1949	10.75
May 4	10.72	Jan. 28, 1943	11.13	Apr. 12	11.47
June 3	11.86	Mar. 19	11.30	May 5	11.55
July 6	12.48	May 18	11.92	June 8	11.76
Aug. 2	13.85	June 12	11.22	July 7	10.29
Sept. 1	12.82	July 9	11.81	Aug. 12	12.59
Oct. 4	13.20	Aug. 2	12.40	Oct. 6	12.53
Dec. 4	13.13	Sept. 15	12.85	Dec. 13	12.34
Jan. 5, 1940	12.93	Oct. 6	12.86	Feb. 9, 1950	11.97
Jan. 31	12.64	Nov. 6	12.53	Apr. 13	12.26
Mar. 5	12.25	Dec. 9	12.36	June 1	12.68
Apr. 2	12.30	Jan. 15, 1944	11.74	Aug. 9	12.12
May 1	12.80	June 8	11.45	Oct. 20	12.20
May 27	13.00	July 12	12.03	Dec. 2	12.07
June 28	13.04				

B13-37-16ab

Date	Water level	Date	Water level	Date	Water level
Aug. 9, 1935	58.37	Oct. 25, 1935	58.69	Sept. 17, 1936	59.28
Aug. 19	58.42	Nov. 28	58.74	Nov. 28	59.38
Aug. 26	58.47	Jan. 1, 1936	58.72	Apr. 5, 1937	59.11
Sept. 4	58.47	Jan. 21	58.68	June 23	59.25
Sept. 16	58.52	Mar. 30	58.65	Aug. 11	59.42
Sept. 23	58.58	June 7	58.78	Oct. 18	59.32
Oct. 7	58.64	Aug. 6	59.11	June 26, 1938	59.05

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-37-16ab—Continued

Date	Water level	Date	Water level	Date	Water level
Oct. 26, 1938	59.15	Oct. 22, 1941	59.62	Sept. 13, 1948	59.08
June 12, 1939	58.75	Nov. 4	59.65	Oct. 9	59.26
Dec. 5	59.40	Dec. 1	59.60	Nov. 8	59.17
Apr. 4, 1940	59.24	Feb. 2, 1942	59.30	Dec. 2	59.17
June 28	59.24	Mar. 2	59.33	Feb. 9, 1949	58.85
July 26	59.42	Apr. 7	59.21	Mar. 4	58.76
Aug. 30	59.49	May 8	58.90	Apr. 12	58.55
Sept. 27	59.59	Aug. 12	58.55	May 5	58.46
Oct. 30	59.57	Oct. 2, 1947	58.96	June 8	58.53
Nov. 7	59.29	Nov. 6	59.05	July 5	58.15
Dec. 2	59.59	Dec. 14	58.98	Aug. 12	58.37
Dec. 30	59.56	Jan. 3, 1948	58.87	Dec. 13	58.74
Feb. 3, 1941	59.51	Feb. 10	58.77	Feb. 9, 1950	58.70
Feb. 28	65.14	Mar. 15	58.62	Apr. 13	58.54
Apr. 12	59.43	Apr. 19	58.77	June 1	58.65
May 7	59.41	June 8	58.75	Aug. 9	58.86
Aug. 4	59.55	July 8	58.83	Oct. 19	58.50
Sept. 2	59.55	Aug. 4	58.87	Dec. 1	58.59
Oct. 1	59.43				

B13-38-3bb

Date	Water level	Date	Water level	Date	Water level
Dec. 2, 1936	14.43	June 28, 1940	14.57	July 12, 1944	14.38
Jan. 4, 1937	13.77	July 26	15.29	Aug. 8	14.60
Feb. 2	12.70	Aug. 30	14.93	Sept. 16	15.15
Mar. 4	13.05	Sept. 27	15.30	Oct. 9	15.18
Apr. 1	13.27	Oct. 30	15.04	Jan. 10, 1945	14.12
May 5	13.98	Nov. 29	14.72	Feb. 13	13.84
June 3	14.34	Dec. 30	14.49	Mar. 10	14.86
July 6	14.87	Feb. 3, 1941	14.27	Apr. 12	13.97
Aug. 2	15.12	Feb. 28	14.06	Aug. 2	14.65
Nov. 2	14.90	Apr. 12	14.04	Oct. 19	14.02
Dec. 3	14.69	May 6	13.81	Dec. 3	13.85
Dec. 31	13.99	June 6	14.36	Jan. 31, 1946	13.54
Feb. 2, 1938	13.87	July 1	14.66	Apr. 15	13.44
Mar. 2	12.80	Aug. 4	15.10	May 8	13.52
Apr. 2	14.02	Sept. 2	15.38	June 4	13.14
May 6	13.62	Oct. 1	14.75	July 18	14.65
June 1	12.68	Nov. 4	14.44	Aug. 6	15.05
July 2	13.50	Dec. 1	14.15	Nov. 23	14.00
Sept. 1	15.04	Feb. 2, 1942	13.43	June 25, 1947	11.50
Oct. 3	13.30	Feb. 26	13.63	Dec. 3	13.80
Nov. 2	13.80	Apr. 7	12.89	Aug. 5, 1948	14.15
Dec. 1	13.85	May 8	9.27	Oct. 29	14.44
Dec. 31	13.23	Aug. 12	13.85	Dec. 2	13.95
Feb. 2, 1939	12.82	Sept. 10	14.66	Feb. 9, 1949	13.00
Mar. 1	12.45	Oct. 8	14.83	Mar. 5	12.62
Apr. 5	12.26	Nov. 13	12.30	Apr. 12	12.59
May 3	12.71	Dec. 15	12.12	May 5	13.02
June 2	13.60	Jan. 28, 1943	12.55	June 8	12.68
July 1	14.30	Mar. 19	13.11	July 7	12.04
Sept. 1	15.18	May 18	13.79	Aug. 12	13.84
Sept. 30	15.23	June 11	13.49	Oct. 6	14.16
Nov. 8	14.89	July 9	14.23	Dec. 13	13.57
Dec. 2	14.77	Aug. 2	15.79	Feb. 9, 1950	12.76
Jan. 7, 1940	14.00	Sept. 15	15.38	Apr. 13	12.96
Jan. 31	14.02	Oct. 6	15.40	June 1	13.66
Mar. 5	13.80	Nov. 6	15.10	Aug. 9	12.84
Apr. 2	13.81	Dec. 9	14.81	Oct. 20	13.78
May 1	14.09	Jan. 15, 1944	14.16	Dec. 2	13.69
May 27	14.37	June 8	12.60		

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-38-6ca1

Date	Water level	Date	Water level	Date	Water level
Dec. 3, 1936	13.29	June 28, 1940	13.91	Sept. 16, 1944	14.63
Jan. 4, 1937	13.02	July 25	14.46	Oct. 14	14.53
Feb. 1	11.72	Aug. 29	14.57	Jan. 10, 1945	13.57
Mar. 2	12.51	Oct. 1	14.45	Feb. 13	13.37
Apr. 1	12.44	Oct. 31	14.12	Mar. 10	13.35
May 5	12.80	Jan. 3, 1941	13.49	Apr. 12	13.49
June 4	13.17	Feb. 5	13.26	Aug. 2	14.35
July 7	13.45	Mar. 3	13.10	Oct. 19	13.75
Aug. 2	13.91	Apr. 12	13.14	Dec. 3	13.70
Nov. 2	14.38	May 5	13.13	Jan. 31, 1946	12.84
Dec. 3	13.58	June 6	13.38	Apr. 15	13.10
Dec. 31	13.16	July 1	13.55	May 8	13.28
Feb. 2, 1938	12.93	Aug. 4	14.11	June 4	13.16
Mar. 2	13.12	Sept. 2	14.57	July 18	14.43
Apr. 1	12.99	Oct. 1	14.37	Aug. 6	14.75
May 5	12.80	Nov. 4	13.73	Nov. 22	14.20
June 1	12.55	Dec. 1	13.25	June 26, 1947	13.00
July 1	12.59	Feb. 2, 1942	12.90	Dec. 3	13.70
Sept. 2	13.81	Feb. 26	12.71	July 9, 1948	13.98
Oct. 3	12.58	Apr. 7	11.96	Aug. 5	14.25
Nov. 4	12.72	May 8	9.94	Sept. 13	14.88
Nov. 30	12.06	Aug. 12	13.37	Oct. 9	14.90
Dec. 31	12.25	Sept. 10	13.64	Nov. 8	14.44
Feb. 6, 1939	11.61	Oct. 8	13.64	Nov. 29	14.01
Mar. 6	11.30	Nov. 13	12.84	Jan. 21, 1949	13.59
Apr. 4	10.73	Dec. 15	12.79	Feb. 9	13.20
May 9	11.11	Jan. 27, 1943	12.60	Mar. 5	12.68
June 16	12.31	Mar. 19	12.51	Apr. 12	12.53
June 30	12.74	May 18	12.58	May 5	12.99
Aug. 1	13.68	June 11	12.46	June 8	12.79
Aug. 31	14.08	July 9	12.98	July 7	11.69
Sept. 30	14.21	Aug. 2	13.93	Aug. 12	14.52
Nov. 6	11.70	Sept. 15	14.47	Oct. 6	14.80
Dec. 1	13.72	Oct. 6	14.59	Dec. 14	14.16
Jan. 8, 1940	13.53	Nov. 5	14.20	Feb. 9, 1950	13.96
Feb. 2	13.16	Dec. 9	13.84	Apr. 13	13.85
Feb. 29	12.98	Jan. 15, 1944	13.33	June 1	14.29
Apr. 9	12.91	June 8	12.48	Aug. 9	15.28
Apr. 30	13.17	July 10	13.36	Oct. 20	14.79
May 24	13.35	Aug. 11	13.80	Dec. 2	14.37

B13-38-9bc

Date	Water level	Date	Water level	Date	Water level
Aug. 13, 1935	20.95	Sept. 13, 1948	23.12	July 5, 1949	24.92
Nov. 6, 1947	23.20	Oct. 9	23.27	Aug. 12	22.49
Dec. 14	23.03	Nov. 8	23.03	Oct. 6	23.09
Jan. 3, 1948	23.04	Nov. 30	23.19	Dec. 13	23.35
Feb. 10	22.56	Jan. 21, 1949	22.90	Feb. 9, 1950	22.76
Mar. 15	22.05	Feb. 9	22.60	Apr. 13	22.82
Apr. 19	22.20	Mar. 4	22.42	June 1	23.30
June 8	22.23	Apr. 12	22.43	Aug. 9	22.85
July 8	22.39	May 5	22.76	Oct. 19	23.14
Aug. 4	22.52	June 8	22.53	Dec. 1	22.88

B13-39-9cc

Date	Water level	Date	Water level	Date	Water level
July 17, 1935	4.59	Sept. 23, 1935	6.46	Nov. 30, 1935	5.55
July 22	4.98	Oct. 7	6.00	Jan. 3, 1936	5.21
July 29	5.01	Oct. 27	5.84	Jan. 23	4.90

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska— Continued

KEITH COUNTY, NEBR.—Continued

B13-39-9cc—Continued

Date	Water level	Date	Water level	Date	Water level
Apr. 1, 1936	5.04	June 8, 1948	6.07	June 8, 1949	4.20
June 11	5.40	July 9	5.98	July 7	3.07
Dec. 4	5.89	Aug. 5	5.65	Oct. 6	6.24
Apr. 8, 1937	5.11	Sept. 14	9.70	Dec. 14	5.35
Oct. 2, 1947	6.32	Nov. 8	5.89	Feb. 9, 1950	4.58
Nov. 5	5.21	Nov. 29	5.34	Apr. 14	4.87
Dec. 13	5.67	Jan. 21, 1949	4.45	June 1	6.04
Jan. 4, 1948	4.65	Feb. 9	4.09	Aug. 8	7.09
Feb. 10	4.20	Mar. 5	4.11	Oct. 20	5.95
Mar. 15	2.86	Apr. 12	3.94	Dec. 2	5.69
Apr. 19	3.75	May 5	4.73		

B13-39-15cd

Date	Water level	Date	Water level	Date	Water level
Nov. 6, 1947	23.70	Oct. 9, 1948	23.65	Oct. 6, 1949	23.63
Dec. 14	23.29	Nov. 8	23.47	Dec. 13	23.79
Jan. 3, 1948	23.37	Jan. 21, 1949	23.30	Feb. 9, 1950	23.50
Feb. 9	23.15	Feb. 9	23.13	Apr. 13	23.46
Mar. 15	22.86	Mar. 4	23.08	June 1	23.73
Apr. 19	22.90	Apr. 12	23.08	Aug. 9	23.95
June 8	23.58	May 5	23.09	Oct. 19	23.75
July 8	23.44	June 8	22.94	Dec. 1	23.58
Aug. 4	23.75	July 5	22.74		

B13-39-19cd

Date	Water level	Date	Water level	Date	Water level
July 10, 1935	41.62	Aug. 12, 1937	41.29	Aug. 4, 1948	42.89
July 22	41.72	Oct. 19	42.44	Sept. 13	43.78
July 29	41.78	June 28, 1938	41.95	Oct. 9	43.62
Aug. 5	41.86	Oct. 28	42.35	Nov. 8	43.18
Aug. 12	41.81	June 14, 1939	41.94	Dec. 1	43.02
Aug. 19	41.68	Dec. 7	42.97	Feb. 9, 1949	43.15
Aug. 26	41.70	Apr. 6, 1940	42.99	Mar. 4	42.70
Sept. 4	41.76	July 29	43.04	Apr. 12	42.69
Sept. 16	41.87	Nov. 9	43.11	May 5	42.79
Sept. 23	41.97	Oct. 25, 1941	43.37	June 8	41.93
Oct. 7	41.89	Nov. 17, 1944	43.25	July 5	42.74
Oct. 27	39.96	Oct. 2, 1947	43.16	Aug. 12	42.99
Nov. 30	40.40	Nov. 6	43.05	Oct. 6	42.68
Jan. 3, 1936	40.85	Dec. 14	43.13	Dec. 13	42.97
Jan. 23	41.06	Jan. 3, 1948	43.15	Feb. 9, 1950	42.90
Apr. 1	41.69	Feb. 9	43.12	Apr. 13	42.38
June 11	41.67	Mar. 15	43.00	June 1	43.57
Aug. 31	42.20	Apr. 19	42.90	Aug. 9	43.83
Dec. 5	41.84	June 8	42.41	Oct. 19	43.85
Apr. 8, 1937	42.11	July 8	42.66	Dec. 1	43.57
June 24	42.15				

B13-39-34dd

Date	Water level	Date	Water level	Date	Water level
July 15, 1935	167.35	Sept. 16, 1935	167.23	Dec. 5, 1936	166.99
July 22	167.14	Sept. 23	167.20	Apr. 9, 1937	167.24
July 29	167.22	Oct. 7	167.27	June 25	167.22
Aug. 5	167.06	Oct. 27	167.16	Aug. 13	167.24
Aug. 12	167.31	Nov. 30	167.17	June 28, 1938	167.16
Aug. 19	167.28	Jan. 3, 1936	166.79	Oct. 28	167.04
Aug. 26	167.35	Jan. 23	167.05	June 14, 1939	166.69
Sept. 4	167.27	Aug. 31	167.10	Dec. 9	166.88

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-39-34dd—Continued

Date	Water level	Date	Water level	Date	Water level
Apr. 8, 1940	166.97	Dec. 14, 1947	168.36	Oct. 9, 1948	167.26
July 29	167.21	Jan. 3, 1948	170.82	Dec. 2	167.05
Oct. 26, 1941	167.26	Feb. 9	171.90	Apr. 12, 1949	166.69
Nov. 19, 1942	167.47	Aug. 4	167.44	Oct. 6	166.07
Oct. 2, 1947	167.29	Sept. 13	168.00	Apr. 13, 1950	167.03
Nov. 6	168.45				

B13-40-22bb1

Date	Water level	Date	Water level	Date	Water level
Jan. 31, 1939	6.28	Oct. 1, 1941	8.60	Apr. 10, 1945	7.74
Feb. 28	6.40	Nov. 4	8.21	Aug. 2	8.22
Apr. 4	5.44	Dec. 1	7.77	Oct. 16	7.85
May 2	5.94	Feb. 2, 1942	7.33	Dec. 3	7.47
June 1	7.55	Feb. 26	7.18	Jan. 31, 1946	7.11
June 30	8.02	Apr. 7	6.63	Apr. 15	6.67
Aug. 1	8.50	May 8	2.64	May 8	7.58
Aug. 31	8.74	Aug. 12	7.96	June 4	7.85
Sept. 30	8.87	Sept. 9	8.35	July 18	8.21
Oct. 30	8.71	Oct. 8	7.95	Aug. 6	8.42
Dec. 1	8.63	Nov. 13	7.45	Nov. 22	7.70
Jan. 7, 1940	8.49	Dec. 15	7.31	June 26, 1947	6.30
Feb. 2	8.40	Jan. 27, 1943	6.90	Dec. 3	7.20
Feb. 29	8.03	Mar. 19	6.82	July 9, 1948	7.28
Apr. 1	7.95	May 13	7.68	Aug. 5	7.62
Apr. 30	8.34	June 11	6.88	Sept. 14	8.39
May 24	8.48	July 9	7.56	Oct. 9	8.41
June 27	8.67	Aug. 2	8.33	Nov. 8	7.74
July 25	8.92	Sept. 15	8.97	Nov. 29	7.03
Aug. 29	9.07	Oct. 6	9.24	Mar. 5, 1949	6.14
Oct. 1	9.07	Nov. 5	8.74	Apr. 12	6.34
Oct. 31	8.86	Dec. 9	8.36	May 5	6.94
Jan. 2, 1941	8.56	Jan. 15, 1944	8.40	June 8	6.59
Feb. 4	8.44	June 8	7.19	July 7	5.54
Mar. 3	8.18	July 10	7.75	Aug. 12	7.77
Apr. 10	8.44	Aug. 11	8.06	Oct. 7	7.53
May 5	8.29	Sept. 16	8.60	Dec. 14	7.02
June 6	8.38	Oct. 9	8.62	Feb. 9, 1950	6.59
July 1	8.44	Jan. 10, 1945	7.39	Apr. 14	6.49
Aug. 4	8.76	Feb. 13	7.40	June 1	[d]8.01
Sept. 2	8.87	Mar. 8	7.48		

B13-40-22cd

Date	Water level	Date	Water level	Date	Water level
July 8, 1935	6.45	June 11, 1936	6.35	July 8, 1948	6.61
July 22	7.19	Aug. 8	7.45	Aug. 4	6.60
July 29	7.51	Aug. 31	7.58	Sept. 13	7.49
Aug. 5	7.70	Dec. 4	7.21	Oct. 9	7.54
Aug. 12	7.92	Apr. 8	7.26	Nov. 8	7.29
Aug. 19	8.08	June 24	8.10	Dec. 1	7.55
Aug. 26	7.97	Aug. 12	5.50	Feb. 9, 1949	7.30
Sept. 4	8.06	Oct. 19	6.40	Mar. 4	6.54
Sept. 16	8.21	Oct. 2, 1947	7.06	Apr. 12	6.19
Sept. 23	8.26	Nov. 6	7.90	May 5	6.63
Oct. 7	8.17	Dec. 14	7.36	June 8	7.13
Oct. 27	7.78	Jan. 3, 1948	7.54	July 5	7.07
Nov. 30	7.13	Feb. 9	7.45	Aug. 12	6.80
Jan. 3, 1936	7.00	Mar. 15	8.10	Oct. 6	8.02
Jan. 23	6.98	Apr. 19	7.40	Dec. 13	8.28
Apr. 1	6.99	June 8	5.18	Feb. 9, 1950	[d]8.17

See footnotes at end of table.

Water-level measurements in wells in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-41-24aa

Date	Water level	Date	Water level	Date	Water level
July 25, 1935	60.58	Sept. 14, 1948	59.19	July 7, 1949	58.20
Nov. 5, 1947	59.30	Oct. 9	59.30	Aug. 12	58.44
Dec. 13	59.15	Nov. 8	59.26	Oct. 7	58.84
Jan. 4, 1948	59.15	Nov. 29	59.23	Dec. 14	58.07
Feb. 10	59.09	Jan. 21, 1949	58.98	Feb. 9, 1950	58.84
Mar. 15	58.85	Feb. 9	58.76	Apr. 13	58.83
Apr. 19	57.70	Mar. 5	58.73	June 1	58.96
June 8	58.96	Apr. 12	58.62	Aug. 8	59.32
July 9	58.91	May 5	59.64	Oct. 20	59.32
Aug. 5	58.98	June 8	58.68	Dec. 2	59.29

B13-41-34cd

Date	Water level	Date	Water level	Date	Water level
July 8, 1935	18.77	Sept. 13, 1948	20.55	July 5, 1949	21.37
Oct. 2, 1947	20.73	Oct. 8	20.82	Aug. 11	19.87
Nov. 6	20.85	Nov. 8	20.90	Oct. • 6	19.89
Dec. 14	20.90	Nov. 29	20.93	Dec. 13	20.08
Jan. 3, 1948	20.95	Jan. 21, 1949	20.86	Feb. 9, 1950	20.47
Feb. 9	21.24	Feb. 9	21.09	Apr. 13	20.64
Mar. 15	21.28	Mar. 4	20.62	June 1	20.52
June 8	21.04	Apr. 12	20.22	Aug. 9	19.50
July 8	20.97	May 5	20.50	Oct. 19	19.92
Aug. 4	19.84	June 8	20.34	Dec. 1	19.64

[a] Well inaccessible for measurement after this date.
[b] Well destroyed after this date. Replaced by well B7-54-12cb.
[c] Well B7-54-12cb replaced well B7-54-12bc as an observation well on this date.
[d] Well destroyed after this date.
[e] Well 864 feet south being pumped at 1,320 gpm.
[f] Affected by floodwater in Bijou Creek about 1,000 feet east.
[g] Well B1-60-27dd replaced well B1-60-26cc as an observation well on this date.
[h] Well B1-60-26cc 400 feet east being pumped; air blowing in well B1-60-27dd.
[i] Center well of battery being pumped.
[j] Well B2-56-13aa2 about 20 feet east being pumped.
[k] Well destroyed after this date; replaced by well B2-56-13aa2.
[l] Well B2-56-13aa2 replaced well B2-56-13aa1 as an observation well on this date. The land-surface datum at well B2-56-13aa2 is 3.2 feet higher than it is at well B2-56-13aa1, although the altitude of the water table is essentially equal at the two wells.
[m] Well B2-56-24ca1 150 feet north being pumped.
[n] Well being pumped.
[o] Well B2-60-10cc2 245 feet east being pumped.
[p] Well sealed after this date.
[q] Because of two changes in pen setting by observer, record between May 14 and August 4, 1946, may be in error as much as 0.25 foot.
[r] Well B3-57-18cc about 420 feet away being pumped at 770 gpm.
[s] Pumping at nearby well.
[t] Well inaccessible for measurement after this date. Replaced by well B3-60-4dc.
[u] Well B3-60-4dc replaced well B3-60-3cc as an observation well on this date.
[v] Well being pumped at 1,390 gpm.
[w] All readings at well B4-57-31db1 probably are affected to some extent by pumping of condenser cooling wells at nearby powerhouse.
[x] Decline of water table caused by the absence of water in a nearby irrigation canal during the nonirrigation season.
[y] Well inaccessible for measurements after this date. Replaced by well B4-58-7cb.
[z] Well B4-58-7cb replaced well B4-58-7ca as an observation well on this date.
[aa] Observation well established to indicate the probable effect the proposed Narrows Dam reservoir will have on the water table.
[bb] Special additional observation well to indicate the probable effect the proposed Narrows Dam reservoir will have on the water table.
[cc] Well being pumped at 1,000 gpm.

[dd] High wind, windmill pumping rapidly.
[ee] Well inaccessible for measurement after this date; replaced by well B4-60-34dc.
[ff] Well B4-60-34dc replaced well B4-60-34cc as an observation well on this date.
[gg] Well being pumped at 1,150 gpm.
[hh] Well being pumped at 760 gpm.
[ii] Well being pumped at 1,280 gpm.
[jj] Well being pumped at about 250 gpm.
[kk] Measurements discontinued; strawstack covering well.
[ll] Well being pumped at 1,325 gpm.
[mm] Waste canal water flowing into abandoned Olds Reservoir about 1,000 feet northeast.
[nn] Flooded fields from broken levee at Lord Reservoir; well not inundated.
[oo] Old well destroyed before this date; measurements continued at well constructed at the site in 1942.
[pp] Well B2-63-22aa about 800 feet east being pumped at 1,000 gpm.
[qq] Well being pumped at 928 gpm.
[rr] Well being pumped at 1,330 gpm.
[ss] Well being pumped at 1,100 gpm.
[tt] Measurements discontinued after this date.
[uu] Well destroyed after this date; replaced by well B13-35-6dd2.
[vv] Well B13-35-6dd2 replaced well B13-35-6dd1 as an observation well on this date.
[ww] Windmill pumping.
[xx] Well temporarily inaccessible after this date.

APPENDIX B

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska

ADAMS COUNTY, COLO.

C1-60-3bc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel	16	22
Clay and fine sand	8	30
Clay	25	55
Clay; contains strips of sand	15	70
Clay and gravel	5	75
Clay	10	85
Clay and sand	7	92
Clay and gravel	18	110
Gravel and fine sand	15	125
Gravel, fine	8	133

C1-60-4bd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	18	18
Sand, coarse	22	40
Sand, fine	10	50
Sand, coarse	10	60
Sand, coarse and fine	15	75
Sand, coarse	5	80
Gravel, fine	5	85
Gravel, coarse	7	92
Clay and sand	8	100
Fox Hills sandstone:		
Shale	4	104

C1-60-9ac

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel	14	20
Sand and fine gravel	20	40
Clay	4	44
Clay; contains strips of sand	8	52
Gravel	6	58
Clay and sand	22	80
Sand, fine	10	90
Clay and sand	3	93
Gravel	29	122
Clay	1	123
Gravel	7	130
Fox Hills sandstone:		
Shale	1	131

C1-60-12cc

[Driller's log of seismograph shot hole 1,000 feet east of the southwest corner of the section. Surface altitude, 4,793 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	20	20
Fox Hills sandstone:		
Sand	102	122
Shale	28	150

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

ADAMS COUNTY, COLO.—Continued

C1-60-17ca

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	7	19
Clay	2	21
Gravel	37	58
Gravel, coarse	12	70
Gravel	18	88
Laramie(?) formation:		
Shale	4	92

C1-60-19cd

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel	4	10
Clay	2	12
Gravel	3	15
Clay	6	21
Gravel	27	48
Gravel, coarse	20	68
Sand	10	78

C1-60-20cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay and sand	17	20
Gravel and fine sand	20	40
Sand and gravel	10	50
Gravel and fine sand	22	72
Gravel and clay balls	8	80
Gravel	6	86

C1-60-20db

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	10	16
Clay	6	22
Gravel	8	30
Sand	6	36
Gravel	4	40
Gravel, coarse	10	50
Gravel and sand	9	59
Gravel	31	90
Laramie formation:		
Coal, shale, and mud	10	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

ADAMS COUNTY, COLO.—Continued

C1-60-23ca

[Driller's log of irrigation well drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	9	12
Clay and sand	5	17
Clay	13	30
Sand	25	55
Clay	4	59
Clay; contains strips of sand	21	80
Gravel, red	17	97
Clay	2	99
Gravel	11	110
Gravel; contains strips of clay	7	117
Gravel and rocks	10	127

C1-60-23dc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	32	35
Sand	11	46
Gravel, fine	4	50
Clay	2	52
Sand and clay	8	60
Sand; contains strips of clay	13	73
Gravel, fine	13	86
Gravel, coarse	7	93
Gravel	5	98
Clay	3	101
Gravel, red	17	118
Gravel	9	127

C1-60-24db

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	18	21
Clay	20	41
Sand, fine	11	52
Clay	3	55
Gravel; contains strips of clay	6	61
Sand; contains strips of clay	16	77
Gravel and sand	13	90
Gravel	7	97
Gravel and sand	12	109
Gravel	4	113
Fox Hills sandstone:		
Shale	4	117

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

ADAMS COUNTY, COLO.—Continued

C1-60-25cb

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay	32	38
Sand	7	45
Clay	20	65
Clay; contains strips of sand	20	85
Gravel	7	92
Clay	1	93
Gravel, cemented	11	104
Gravel; contains strips of clay	16	120
Fox Hills sandstone:		
Shale	4	124

C1-60-26bd

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	2	9
Clay	1	10
Sand, fine	8	18
Clay	12	30
Sand	6	36
Gravel and sand	2	38
Gravel, fine	28	66
Clay	2	68
Clay and sand	8	76
Gravel, coarse	14	90
Gravel	7	97
Clay, blue	2	99
Gravel, coarse	16	115
Gravel	4	119

C1-60-26dd

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	12	24
Clay	4	28
Sand	7	35
Clay	2	37
Sand	18	55
Clay	1	56
Sand	4	60
Clay	10	70
Sand; contains strips of clay	18	88
Clay	2	90
Gravel	4	94
Clay	1	95
Gravel	10	105

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

ADAMS COUNTY, COLO.—Continued

C1-60-29bc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay, sandy	16	18
Sand	12	30
Sand, coarse	20	50
Sand, fine, yellow	.5	50.5
Sand, coarse	5.5	56
Sand; contains strips of clay	3	59
Laramie formation:		
Shale	1	60

C1-60-31cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	4	7
Sand	11	18
Clay	2	20
Gravel	17	37
Clay	2	39
Sand	31	70
Gravel	15	85
Laramie formation:		
Shale	15	100

C1-60-35ac

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	4	12
Sand and clay	3	15
Clay	11	26
Sand and coarse gravel	14	40
Gravel	10	50
Clay	8	58
Gravel; contains strips of clay	12	70
Gravel	13	83
Gravel, cemented	1	84
Gravel; contains strips of clay	11	95
Gravel and rock	4	99
Clay	1	100
Gravel	3	103
Laramie formaion:		
Shale	2	105

C2-60-6cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	5	9
Sand and clay	6	15

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

ADAMS COUNTY, COLO.—Continued

C2-60-6cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand and gravel	7	22
Gravel	14	36
Gravel and blue clay	7	43
Gravel; contains strips of clay	13	56
Gravel	6	62
Gravel, coarse	19	81
Gravel and sand	11	92
Laramie formation:		
Shale	8	100

C2-61-34cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay	11	17
Sand	4	21
Clay, sandy	12	33
Sand	7	40
Gravel	10	50
Clay strips, interbedded with gravel	7	57
Clay	13	70
Gravel	4	74
Pierre shale:		
Shale	6	80

C3-60-7cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	7	12
Clay, sandy	3	15
Clay	5	20
Sand and gravel	20	40
Sand, fine, and gravel	8	48
Gravel; contains strips of clay	8	56
Sand and coarse gravel	4	60
Clay	8	68
Gravel	10	78
Fox Hills sandstone:		
Shale	2	80

C3-61-3ca

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Gravel	15	20
Clay	10	30
Gravel	20	50
Clay	8	58
Sand	10	68

Log of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

ADAMS COUNTY, COLO.—Continued

C3-61-3ca—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	10	78
Clay	2	80
Sand	10	90
Gravel	16	106
Pierre shale(?):		
Shale	6	112

C3-61-3cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	5	10
Sand and gravel	7	17
Clay	6	23
Clay, sandy	7	30
Gravel	10	40
Sand, fine	3	43
Gravel; contains strips of clay	7	50
Clay, sandy	4	54
Clay	6	60
Sand, fine; contains strips of clay	5	65
Clay	15	80
Sand	13	93
Gravel	7	100
Pierre shale(?):		
Shale	10	110

C3-61-3dc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	7	12
Sand	3	15
Clay	2	17
Sand	3	20
Clay	20	40
Clay, sandy	36	76
Sand	4	80
Sand; contains strips of clay	20	100
Gravel	16	116
Pierre shale:		
Shale	4	120

C3-61-10dd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Clay	19	34
Sand	8	42
Clay	8	50
Gravel	4	54
Sand	2	56
Gravel	13	69

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

ADAMS COUNTY, COLO.—Continued

C3-61-10dd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	9	78
Gravel	6	84
Clay and gravel	22	106
Clay	6	112

C3-61-21bd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay	9	17
Sand	13	30
Sand; contains strips of clay	26	56
Pierre shale(?):		
Shale	9	65

C3-61-24ac

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay, sandy	18	23
Gravel, sandy	7	30
Clay and sand	5	35
Clay	13	48
Clay, sandy	4	52
Gravel	6	58
Sand	6	64
Clay	6	70
Gravel and clay balls	10	80
Sand and gravel	15	95
Gravel, coarse	8	103
Pierre shale(?):		
Shale	9	112

C3-61-24dd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	40	45
Clay, sandy	9	54
Sand	6	60
Gravel	8	68
Gravel, coarse	12	80
Clay, sandy	3	83
Gravel, coarse	14	97
Pierre shale(?):		
Shale	3	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.

B6-53-2bb

[Sample log of test hole 230 feet east and 15 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 3,997 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, silty, dark-gray	5	5
Gravel, fine, and medium sand; tan to brown	12	17
Sand, very coarse, tan to gray	23	40
Gravel, medium; contains pebbles and coarse sand; tan to brown	56	96
Pierre shale:		
Shale, laminar, brown	3	99
Shale, brittle, gray to black	1	100

B6-53-2dc

[Sample log of test hole 60 feet east and 345 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,008 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium; contains silt; gray to black	3	3
Caliche, sandy, brittle, light-gray	7	10
Clay, sandy, black	5	15
Sand, medium to coarse, gray	25	40
Gravel, fine to medium, sandy, tan to gray	27	67
Pierre shale:		
Shale, platy, tan	1	68
Shale, brittle, black	2	70

B6-53-10dc

[Driller's log of irrigation well drilled by Hessler Bros. Surface altitude, 4,026.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil and silt	17	17
Sand	36	53
Gravel, medium	20	73

B6-53-14aa

[Sample log of test hole 55 feet west and 720 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,070 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, light-tan	26	26
Clay, tan to brown	3	29
Sand, fine to medium; contains silt; tan	27	56
Clay, sandy, green to brown	3	59
Gravel, fine to medium, and coarse sand; pink to tan	11	70
Pierre shale:		
Shale, platy, tan to brown	6	76
Shale, platy, brittle, black	4	80

B6-53-19cd

[Sample log of test hole in southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,046 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, dark-gray	6	6
Sand, medium to coarse; contains clay; tan	3	9

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B6-53-19cd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine to medium, and medium to coarse sand; tan to gray	82	91
Sand, fine to coarse; contains fine to coarse gravel and pebbles; buff	28	119
Sand, medium to coarse, tan	16	135
Sand, medium to coarse, tan to gray	15	150
Sand, coarse, and fine gravel; tan to gray	40	190
Pierre shale:		
Sandstone, medium-grained, well-cemented, calcareous, blue to gray	2	192

B6-53-31ad

[Sample log of test hole 390 feet west of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,061 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, tan to gray	30	30
Sand, fine to coarse, and fine gravel; tan to gray	28	58
Gravel, fine to medium, sandy, tan to brown	14	72
Pierre shale:		
Shale, sandy, brittle, black	5	77

B6-54-11ad

[Sample log of test hole 15 feet west and 200 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,129 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium; contains silt; dark-brown	6	6
Sand, medium to fine; contains silt; tan	4	10
Caliche, gritty, soft, light-buff	9	19
Gravel, very coarse; contains sand and calcareous clay; pink to tan	4	23
Caliche, sandy, buff	4	27
Clay, sandy, thin-bedded, slightly calcareous, tan	3	30
Gravel, coarse to fine, and medium to coarse-sand, pink to tan	28	58
Gravel, coarse to very coarse, and pebbles, brown to gray	32	90
Cobbles, and coarse gravel, brown; contains fragments of shale	1	91
Pierre shale:		
Shale, sandy, brown	1	92
Shale, brittle, black	4	96

B6-54-13ac

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,051 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium, tan to gray	17	17
Gravel, medium; contains some coarse gravel and coarse sand; brown	13	30
Sand, coarse, and medium gravel, light-gray	8	38
Gravel, fine to medium, and coarse sand; tan to brown	10	48
Clay, sandy, light-blue to gray	4	52
Gravel, coarse to medium; contains minor amounts of sand and clay; tan.	8	60
Clay, blue to gray	3	63
Gravel, coarse to fine; contains coarse sand and pebbles; tan	16	79
Pierre shale:		
Shale, tan to brown	3	82
Shale, thin-bedded, brittle, blue to black	6	88

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B6-54-23cc2

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,060 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	2	5
Clay	3	8
Sand	9	17
Gravel	14	31
Gravel and sand	5	36
Gravel	7	43
Clay	4	47
Gravel and rocks	8	55
Clay	3	58
Gravel and rocks	11	69
Pierre shale:		
Shale	4	73

B6-54-24ad

[Sample log of testhole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,032 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gravel, medium to fine, and coarse sand, brown	3	3
Gravel, fine to medium, and coarse sand, calcareous, black to gray	3	6
Gravel, medium to fine; contains medium and coarse sand; tan to gray	14	20
Sand, medium to coarse, tan to gray	14	34
Gravel, fine to medium, and coarse sand, brown	26	60
Sand, medium to coarse, brown	6	66
Gravel, fine to coarse, tan to brown	23	89
Sand, fine to medium; contains some coarse sand and fine gravel; gray	6	95
Gravel, fine, and coarse sand, tan to gray	10	105
Gravel, medium, tan to brown	2	107
Pierre shale:		
Shale, soft, brown	11	118
Shale, brittle, gritty, black	8	126

B7-52-3bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1941]

Pleistocene and Recent deposits, undifferentiated:		
Sand	57	57
Gravel, fine	17	74
Sand, fine	16	90
Gravel, coarse	8	98
Pierre shale:		
Shale	2	100

B7-52-11da

[Sample log of test hole 800 feet west and 500 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,145 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, tan to gray	35	35
Sand, medium; contains clay; tan	5	40
Sand, fine to medium	25	65
Gravel, fine, sandy, tan to gray	25	90
Gravel, medium to coarse, tan to brown	40	130

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B7-52-11da—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale, platy, brittle, green to brown	4	134
Shale, black	1	135

B7-53-1cc

[Driller's log of irrigation well drilled by Stewart Drilling Co., 1936. Surface altitude, 3,974.3 feet]

Pleistocene and Recent Deposits, undifferentiated:		
Soil and sand	34	34
Gravel	6	40
Clay	16	56
Gravel and clay	31	87
Clay	5	92

B7-53-6dd

[Sample log of test hole 25 feet west and 140 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,181 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gravel, fine to coarse; contains silt and sand; dark-brown	6	6
Caliche, hard, sandy, buff to tan	4	10
Gravel, coarse to medium, and coarse sand, tan to brown	11	21
Pierre shale:		
Shale, platy, brittle, sandy, tan to gray	5	26
Shale, brittle, black	4	30

B7-53-17bd

[Sample log of test hole 500 feet west and 60 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,061 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, silty, brown	10	10
Clay, sandy, tan to brown	9	19
Gravel, fine to medium, and medium to coarse sand, brown	16	35
Pierre shale:		
Shale, sandy, tan to gray	2	37
Shale, brittle, black	3	40

B7-53-19ad

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	29	33
Gravel	23	56
Clay	4	60
Gravel, interbedded with clay	15	75
Sand, fine, and clay	4	79
Gravel	6	85
Pierre shale:		
Shale	10	95

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.—Continued

B7-53-21bb

[Driller's log of irrigation well drilled by Hessler Bros., 1939. Surface altitude, 4,046.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and sandy silt	20	20
Gravel	30	50
Clay	3	53
Gravel, medium and coarse	25	78
Pierre shale:		
Shale	1	79

B7-53-22ab

[Driller's log of test hole drilled by Stewart Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	23	23
Sand, very fine and fine	7	30
Gravel	15	45
Pierre shale:		
Shale	1	46

B7-53-23bb

[Driller's log of irrigation well drilled by Stewart Drilling Co., 1940. Surface altitude, 4,012.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and sandy silt	31	31
Sand, fine	10	41
Gravel	9	50
Clay	18	68
Gravel	34	102

B7-53-27bc

[Sample log of test hole 25 feet east and 70 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,008 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt and fine sand, dark-brown	3	3
Clay, sandy, tan; contains calcareous concretions	12	15
Clay, plastic, blue	2	17
Sand, very coarse, and fine gravel, dark-blue to gray	6	23
Gravel, fine to medium, and coarse sand, dark-gray	17	40
Clay, sandy, laminar, soft, blue to gray	12	52
Gravel, coarse to medium, and coarse to medium sand, gray to brown	26	78
Pierre shale:		
Shale, tan	1	79
Shale, laminar, black	1	80

B7-53-27db

[Driller's log of irrigation well drilled by Stewart Drilling Co., 1937. Surface altitude, 4,006.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Gravel	30	30
Clay	12	42
Gravel	48	90

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— **Continued**

LOGAN COUNTY, COLO.—Continued

B7-53-27db—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale	1	91

B7-53-34bd

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 3,995 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, dark-brown	3	3
Gravel, fine; contains medium and coarse sand; tan to gray	36	39
Clay, blue to gray	2	41
Gravel, fine to medium; contains medium and coarse sand; tan to gray	59	100
Sand, fine to coarse; contains fine gravel and pebbles; tan to gray	12	112
Gravel, fine to medium; contains fine to coarse sand and pebbles; tan to brown.	26	138
Sand, medium to coarse, and clay, tan	2	140
Sand, medium, tan to gray	6	146
Sand, coarse to very coarse, and fine gravel, tan to gray	16	162
Sand, medium to coarse, tan; contains a few pebbles of green shale	17	179
Sand, medium to coarse, gray	44	223
Gravel, fine; contains coarse sand and pebbles; blue to gray	11	234
Gravel, coarse, blue to gray	2	236
Pierre shale:		
Shale, sandy, thin-bedded, brittle, blue to black	11	247

B7-54-35cd

[Sample log of test hole 1,040 feet west and 20 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,240 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, and silt, brown	3	3
Sand, fine to medium, tan to brown	22	25
Clay, soft, calcareous, and fine sand, buff to gray	2	27
Sand, fine to medium, and clay, tan	8	35
Caliche, gritty, buff	7	42
Pierre shale:		
Shale, thin-bedded, platy, brittle, green to brown	11	53

B8-49-10bb

[Driller's log of test hole drilled by Mr. Vance, 1920. Surface altitude, 4,233.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Top soil	4	4
Sand and clay	21	25
Clay	75	100
Gravel	10	110
Shale	65	175
Gravel	10	185

B8-49-21aa

[Driller's log of domestic and stock well. Surface altitude, 4,285.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	21	25

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B8-49-21aa—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation(?):		
Caliche	10	35
Gravel	15	50
Clay, yellow	50	100
Clay, black	5	105
Clay, yellow	95	200
Gravel	15	215
Pierre shale(?):		
Shale	185	400

B8-50-3dd

[Driller's log of domestic well. Surface altitude, 4,369.4 feet]

Recent deposits:		
Soil	3	3
Ogallala formation(?):		
Sand	22	25
Gravel	10	35
Pierre shale:		
Clay	135	170
Shale	117	287

B8-50-16dd

[Driller's log of domestic and stock well. Surface altitude, 4,361.3 feet]

Pleistocene and Recent deposits(?), undifferentiated, and Ogallala formation(?):		
Sand	60	60
White River group(?):		
Clay	116	176
Sand	4	180
Pierre shale:		
Shale, blue	90	270
Rock, hard, porous	5	275
Shale, blue	25	300
Rock, hard, porous	10	310

B8-52-4bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	4	10
Clay	4	14
Sand, fine	16	30
Clay	11	41
Sand	14	55
Clay	9	64
Gravel	13	77
Clay	5	82
Gravel	11	93
Clay	1	94
Pierre shale:		
Shale	6	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.—Continued

B8-52-17cb

[Driller's log of irrigation well drilled by Stewart Drilling Co., 1939. Surface altitude, 3,984.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, silt, and sand	22	22
Gravel	29	51
Clay	10	61
Sand	10	71
Pierre shale:		
Shale	1	72

B8-52-18bb

[Driller's log of test hole drilled by Butler-Western Drilling Co., 1935. Surface altitude, 4,013.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand and silt	45	45
Sand, fine, and clay	20	65
Gravel, coarse	10	75

B8-52-20ad

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 3,922.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, silty, brown	2	2
Clay, silty, calcareous, brown	9	11
Clay, firm, lignitic, green to black	7	18
Gravel, medium; contains clay; brown	20	38
Clay, plastic, calcareous, gray	4	42
Gravel, coarse, brown	11	53
Clay, lignitic, gray to black	4	57
Gravel, medium, sandy, yellow to brown	23	80
Clay, green, gray to brown	1	81
Gravel, medium, sandy, tan	34	115
Gravel, fine, green to gray	5	120
Sand, coarse, green to gray	25	145
Clay, sandy, gray	15	160

B8-52-20ba

[Sample log of test hole 10 feet west and 45 feet south of northeast of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 3,925 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, dark-brown	6	6
Clay, gritty, tan	5	11
Clay, calcareous, gray, brown and blue	7	18
Gravel, medium, sandy, gray	14	32
Clay, calcareous, tan	15	47
Gravel, medium, and coarse sand, tan to brown	38	85
Sand, medium to coarse, and fine gravel, gray	4	89
Clay, blue; contains coarse gravel	6	95
Gravel, very fine; contains medium and coarse sand; green to gray	45	140
Gravel, medium to coarse, and coarse sand, blue to gray	52	192
Pierre shale:		
Shale, blue	6	198
Shale, gritty, thin-bedded, gray	7	205

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B8-52-21cc

[Driller's log of irrigation well drilled in 1929]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	9	9
Sand, and some gravel	31	40
Gravel	50	90

B8-52-27dc

[Driller's log of public supply well drilled by Canfield Drilling Co., 1941. Surface altitude, 3,964.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	32	32
Clay, sandy	5	37
Sand, fine	4	41
Gravel, fine	13	54
Gravel, medium	17	71
Clay	4	75
Clay and gravel	12	87

B8-52-27dd

[Driller's log of test hole 300 feet north of southwest corner of quarter-quarter section, drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium	38	38
Sand, medium to coarse	7	45
Gravel, fine	15	60
Sand, clean	5	65
Gravel, clean, coarse	16	81
Pierre shale:		
Shale, weathered	3	84
Shale, blue	1	85

B8-52-28db

[Sample log of test hole 15 feet west and 20 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 3,923 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, light-gray	2	2
Gravel, medium, and coarse sand, gray to brown	8	10
Gravel, fine; contains medium and coarse sand; gray to brown	30	40
Gravel, medium to coarse, tan to brown	17	57
Clay, sandy, green to brown	4	61
Gravel, fine; contains medium and coarse sand	16	77
Pierre shale:		
Shale, platy, brown	2	79
Shale, blue to black	1	80

B8-52-34bc

[Sample log of test hole 150 feet east and 160 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 3,929 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, dark-brown	4	4
Gravel, very fine and fine, and coarse sand, tan to brown	34	38

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO. —Continued

B8-52-34bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine to medium, and fine to coarse sand, tan to brown	7	45
Pierre shale:		
Shale, brown to green	1	46
Shale, blue to black	4	50

B8-52-34cc1

[Driller's log of public-supply well drilled by Canfield Drilling Co., 1948. Surface altitude, 3, 956.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	31	31
Sand, interbedded with thin layers of clay	4	35
Sand, coarse	6	41
Sand, fine, and gravel	3	44
Sand, coarse, and gravel	18	62
Gravel, coarse	8	70
Pierre shale:		
Shale	1	71

B8-52-34cc2

[Driller's log of test hole drilled by Canfield Drilling Co., 1948. Surface altitude, 3, 968.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	34	34
Sand, fine, interbedded with thin layers of clay	14	48
Sand, coarse, and gravel	6	54
Sand, fine	7	61
Sand, coarse	13	74
Gravel, coarse	8	82
Pierre shale:		
Shale	2	84

B8-52-34cd

[Driller's log of test hole 700 feet north of southeast corner of quarter-quarter section, drilled by Canfield Drilling Co., 1941]

Pleistocene and Recent deposits, undifferentiated:		
Sand	19	19
Clay	2	21
Sand, fine	13	34
Clay	1	35
Sand, fine	33	68
Gravel, fine	11	79
Gravel and cobbles	3	82
Sand, fine, cemented	8	90
Sand, interbedded with layers of clay	6	96
Gravel, fine	3	99
Clay	2	101
Gravel	7	108
Pierre shale:		
Shale	8	116

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B8-52-35bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1941]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	31	31
Clay and sand	23	54
Sand	16	70
Gravel, fine	6	76
Gravel, fine to medium	7	83
Pierre shale:		
Shale	3	86

B8-53-1dd

[Sample log of test hole 545 feet west and 150 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,011 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, coarse; contains silt and clay; dark-brown	3	3
Gravel, medium, and fine to coarse sand, brown	3	6
Clay, sandy, calcareous, tan to buff	6	12
Pierre shale:		
Shale, thin-bedded, brittle, yellow to tan	8	20

B8-53-24dd

[Driller's log of test hole. Surface altitude, 4,003.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand and clay	30	35
Gravel	25	60

B9-50-4da

[Sample log of test hole in northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,812 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay and hard sand, brown	7.5	7.5
Sand, fine to medium, light-brown	13.5	21
Gravel, medium, sandy, pink to tan	2	23
Gravel, medium; contains fine sand and clay; tan to pink-tan	20	43
Gravel, fine to medium; contains fine to coarse sand; pink to tan	20	63
Gravel, medium to coarse, and medium sand; pink to tan	40	103
Gravel, very fine to medium; contains coarse to medium sand; stained yellowish brown with iron oxide	9	112
Gravel, fine to medium, and reworked tan Brule siltstone	11	123
Clay; contains medium to fine sand; buff to yellow	5	128
Gravel, medium and coarse, and coarse sand, pink to tan	5	133
Clay, and fine sand, light-gray to buff	3	136
Gravel, medium to coarse, pink to tan	7	143
Sand, medium to fine; contains 20 percent fine to very fine gravel; pink to tan	10	153
Sand, medium to fine; contains 30 percent fine to medium gravel; pink to tan	10	163
Gravel, coarse to medium, pink to tan; contains tan fine sand	15.4	178.4
Pierre shale:		
Clay and shale; yellow to brown	1.6	180
Shale, blue to black	3	183

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

LOGAN COUNTY, COLO.—Continued

B9-50-4dd

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,852 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	23	23
Sand, fine to medium; contains fine gravel and silty clay; brown	10	33
Sand, medium; contains some fine sand and fine gravel; brown	10	43
Sand, medium; contains some fine sand; brown	20	63
Sand, fine to medium; contains clay; buff to tan	10	73
Sand, very fine, light-brown	7	80
Sand, coarse, and very fine gravel; pink to tan	13	93
Gravel, fine to medium, pink to tan	10	103
Gravel, fine to coarse, pink to tan; contains tan to buff layers of clay at 116.5 and 119.4 feet	33	136
Clay, tan to buff	1.5	137.5
Gravel, fine to coarse, pink to tan	.5	138
Clay, tan to buff	1	139
Gravel, fine to coarse, pink to tan	4	143
Clay, sandy, tan to buff	34	177
Gravel, fine to medium; contains sandy clay, reworked pink and blue Chadron clay, and tan Brule siltstone	68	245
Gravel, medium to coarse; contains sandy clay, reworked pink and blue Chadron clay, and tan Brule siltstone	31	276
Pierre shale:		
Shale, black, hard	4	280

B9-50-10bc

[Sample log of test hole in southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,863 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	100	100
Gravel, fine to very fine, pink to tan	3	103
Gravel, medium, pink to tan; contains yellow to brown clay	8	111
Pierre shale:		
Shale, blue to black	12	123

B9-51-16cd

[Sample log of test hole 8 feet west and 431 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,833 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gravel, medium to coarse	13	13
Gravel, medium to coarse, intermixed with sandy clay	10	23
Gravel, fine to coarse, pink to tan	35.2	58.2
Clay, sandy, tough, tan	5.8	64
Gravel, fine to medium, pink to tan	9	73
Gravel, fine to medium, pink to tan; contains 10 percent yellow to tan clay	10	83
Sand, medium and coarse; contains 30 percent fine to medium gravel; brown	10	93
Sand, coarse, and fine gravel; pink to tan	10	103
Sand, medium to coarse, and fine to medium gravel, pink to tan	10	113
Gravel, medium to coarse; contains 10 percent medium sand; pink to tan	10	123
Gravel, medium to coarse, pink to tan	10	133
Gravel, medium to coarse; contains reworked pink and blue Chadron clay	10.5	143.5
Pierre shale:		
Shale, blue to black	6.5	150

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B9-51-16db

[Sample log of test hole 10 feet east and 60 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,834 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy, dark-brown	4	4
Clay, very sandy, yellow to brown	4	8
Gravel, fine to medium, pink to tan	5	13
Gravel, fine to very coarse, pink to tan	10	23
Gravel, coarse and medium; contains 5 percent pebbles; pink to tan	20	43
Clay, light-tan, sandy; contains interbedded coarse and medium gravel	10	53
Gravel, coarse and medium; contains 5 percent pebbles; pink to tan	.6	53.6
Pierre shale:		
Shale, tough, blue to black	6.4	60

B9-51-17aa

[Sample log of test hole 28 feet west and 22 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,838 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, tough, upper part slightly sandy, light-brown	8	8
Clay, tough, blue-black to black	2	10
Gravel, medium and fine, pink to tan	3	13
Gravel, fine to coarse, pink to tan	13	26
Pierre shale:		
Shale, blue to black	7	33

B9-51-21ad

[Sample log of test hole 30 feet west of bridge and 15 feet north of private road, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,836 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, black to dark-brown	3	3
Gravel, fine to medium, pink to tan; contains 30 percent medium sand	16.5	19.5
Clay, slightly sandy, light-gray	2.4	21.9
Gravel, fine to medium, pink to tan	1.1	23
Gravel, medium to coarse, pink to tan	82	105
Clay, yellow to brown, interbedded with layers of sand	7	112
Gravel, medium to coarse, pink to tan	1	113
Gravel, coarse, and pebbles, pink to tan	12.5	125.5
Pierre shale:		
Clay, dark-gray and yellow to brown	17.5	143

B9-51-22cc

[Sample log of test hole 12 feet east and 465 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,878 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to very coarse, brown	33	33
Sand, coarse to very coarse; contains fine to medium gravel; pink to tan	10	43
Gravel, fine to coarse; contains 30 percent medium to coarse sand; pink to tan	10	53
Gravel, fine to coarse	10	63
Gravel, fine to medium; contains 70 percent coarse gravel	10	73
Gravel, medium and coarse	20	93
Gravel, fine to medium; contains 10 percent coarse sand	10	103
Pierre shale:		
Clay, yellow and yellow to brown	10	113
Clay, mottled dark-gray and yellow	10	123

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B9-51-28da

[Sample log of test hole 8 feet west and 15 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,869 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to coarse	23	23
Gravel, fine to medium	10	33
Gravel, fine to coarse; contains 20 percent fine to coarse sand	10	43
Gravel, medium to coarse	30	73
Gravel, medium to coarse, and pebbles, pink to tan	16.5	89.5
Pierre shale:		
Shale, black to bluish-black	3.5	93

B9-51-33dd

[Sample log of test hole 35 feet west and 14 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,992 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine to coarse, light-tan	45.3	45.3
Sand, very fine to very coarse, and fine gravel, pink to tan	17.7	63
Sand, very fine to very coarse; contains fine gravel, reworked pink and blue Chadron clay, and tan Brule siltstone	20	83
Gravel, fine and medium pink to tan; contains reworked tan Brule siltstone	24	107
Sand, fine, tan to brown	.5	107.5
Gravel, fine and medium, pink to tan; contains reworked tan Brule siltstone	12.5	120
Pierre shale:		
Shale, black to bluish-black	3	123

B9-51-34bb

[Sample log of test hole 10 feet east and 10 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,904 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, light-tan	43	43
Sand, medium to coarse, light-tan	10	53
Gravel, fine to medium; contains 30 percent medium sand; light-tan	10	63
Gravel, fine to medium, interbedded with layers of clay, tan	10	73
Gravel, fine to coarse, pink to tan	21	94
Pierre shale:		
Clay, sandy, cemented, very hard, light-gray	.5	94.5
Shale, black to bluish-black	8.5	103

B9-51-34bc

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,941 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine to medium; contains 10 percent coarse sand; light-brown	50	50
Sand, very fine to coarse; contains 20 percent fine gravel; pink to tan	3	53
Gravel, fine to medium, and tan clay	10	63
Gravel, fine to coarse	20	83
Sand, very fine and fine	10	93
Gravel, medium and coarse, pink to tan	10	103
Gravel, medium and coarse; contains 30 percent very fine sand	10	113
Gravel, medium and coarse, pink to tan	3.5	116.5
Clay, tan	1	117.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B9-51-34bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, medium and coarse, pink to tan	9.5	127
Pierre shale:		
Shale, black to bluish-black	5	132

B10-48-1cc

[Sample log of test hole 64 feet east and 64 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 669 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, and clay, tan	5	5
Clay, light-tan	.5	5.5
Sand, fine to medium, brown	21	26.5
Sand, medium, interbedded with coarse gravel, pink to tan	11	37.5
Sand, medium, and fine to coarse gravel; contains interbedded clay	41.5	79
Chadron formation:		
Clay, tan to yellow	4	83
Clay, tan to yellow and pink	20	103

B10-48-2aa

[Sample log of test hole in center of road at south end of abandoned bridge in southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 648 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gravel, medium to coarse, and pebbles, pink to tan	13	13
Gravel, coarse to very coarse; contains 40 percent pebbles	20	33
Gravel, medium to coarse, pink to tan	13	46
Chadron formation:		
Clay, white to light-gray with streaks of dark gray	7	53
Clay, mottled blue, pink, and green	10	63

B10-48-2da

[Sample log of test hole 51 feet south and 207 feet west of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 657 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	11.5	11.5
Gravel, medium to coarse, pink to tan to gray	21.5	33
Gravel, fine to medium, pink to tan	21	54
Chadron formation:		
Clay, sandy, mottled pink and blue-gray	9	63

B10-48-11ac

[Sample log of test hole 1, 000 feet south and 270 feet west of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 716 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium and fine, and fine gravel; cemented from 2.5 to 3 feet	30.5	30.5
Gravel, fine to medium, and fine sand, tan	12.5	43
Sand, medium to coarse, and fine gravel; pink to tan	28.5	71.5
Clay, very slightly sandy, white to light-gray	3.5	75
Gravel, medium to coarse, pink to tan	58	133
Gravel, very fine to fine; contains 30 percent medium to coarse sand	10	143

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-48-11ac—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, medium and coarse to very fine; contains medium to coarse sand and reworked tan Brule siltstone	10	153
Gravel, fine to coarse; contains medium to coarse sand interbedded with layers of clay	10	163
Gravel, fine to medium and fine to coarse sand, pink to tan	30	193
Gravel, fine to medium, pink to tan	10	203
Sand, very fine to fine, and medium gravel, tan	20	223
Gravel, fine to medium, pink to tan	21	244
Gravel, coarse to very coarse, pink to tan	49	293
Pierre shale:		
Clay, yellow to brown	3	296

B10-48-14ba

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,793 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, coarse to medium, brown	13	13
Sand, fine to coarse	10	23
Sand, coarse, and fine gravel, light-tan	25	48
Gravel, fine to medium, pink to tan	15	63
Gravel, fine to very coarse, and medium sand	22	85
Chadron formation:		
Clay, tan to light greenish-gray	8	93
Clay, light greenish-gray	12	105

B10-49-10aa

[Sample log of test hole 53 feet west and 57 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,709 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, dark-brown to black	4.5	4.5
Clay; contains silt and fine sand; light-brown	1.5	6
Sand, fine to medium, yellow to brown	2.5	8.5
Clay, black	1.5	10
Gravel, medium to coarse, pink to tan	28.5	38.5
Chadron formation:		
Clay, greenish-blue	4.5	43

B10-49-11cb

[Sample log of test hole 105 feet east and 22 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,709 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, black	4	4
Silt; contains calcareous concretions; tan to yellow-brown	2	6
Clay, gray to green	4	10
Clay, black	2	12
Sand, medium to coarse, and fine gravel; light-gray	1	13
Sand, medium to coarse, and fine to medium gravel, light-gray	4	17
Gravel, medium to coarse, pink to tan	6	23
Gravel, fine to medium, pink to tan	13	36
Clay, interbedded with silt and fine sand, greenish-gray	2.5	38.5
Gravel, medium to coarse, pink to tan	1.5	40
Clay, greenish-gray; contains intermixed silt and fine sand	10	50
Chadron formation:		
Clay, blue to gray	3	53

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-49-14bb

[Sample log of test hole 73 feet east and 11 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,710 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, black	2	2
Clay and silt, light-gray	2.5	4.5
Sand, medium to coarse, yellow to brown, and tan clay	1.5	6
Gravel, fine, and coarse sand, light-gray	4	10
Gravel, medium to coarse, pink to tan	3	13
Sand, very fine, and silt, brown	7	20
Gravel, coarse to very coarse; contains some medium gravel; pink to tan	3	23
Gravel, coarse to very coarse, and pebbles, pink to tan	10	33
Gravel, medium to coarse	8.5	41.5
Chadron formation:		
Clay, silty and sandy, light-gray to yellowish-brown	1.5	43

B10-49-15da

[Sample log of test hole 110 feet west of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,710 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium and coarse, light-brown	8.2	8.2
Gravel, medium and coarse, pink to tan	33	41.2
Chadron formation:		
Clay, sandy and silty, green to gray	1.8	43
Clay, sandy and silt, silty, green to gray; contains some intermixed light-blue clay	10	53

B10-49-23bb

[Sample log of test hole 22 feet east and 300 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,711 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3.5	3.5
Gravel, medium to coarse, pink to tan	9.5	13
Gravel, medium to very coarse, pink to tan (cemented 47-49 feet)	40	53
Gravel, medium to very coarse, and pebbles, pink to tan	10	63
Gravel, medium to coarse, pink to tan	10	73
Gravel, medium to coarse, pink to tan; contains reworked pink and blue Chadron clay and fine to medium sand	15	88
Chadron formation:		
Clay and silt, pink and gray to blue and green	5	93

B10-49-23bc

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,744 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine to medium, light-brown to tan	13	13
Silt and very fine sand, tan to brown	10	23
Silt and very fine to coarse sand	10	33
Sand, medium to coarse and fine gravel, pink to tan	10.5	43.5
Gravel, medium to coarse	19.5	63
Gravel, fine to medium, pink to tan	6	69
Gravel, medium to coarse, pink to tan	18.5	87.5
Clay, sandy, light-tan	25.5	113
Silt and sand, green to greenish-brown	3	116
Gravel, medium pink to tan	28.5	144.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-49-23bc—Continued

	Thickness (feet)	Depth (feet)
Chadron formation:		
Silt and clay, blue and light-gray	8.5	153

B10-49-23cb

[Sample log of test hole 600 feet south and 25 feet east of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 745 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, light- to medium-brown	23	23
Sand, fine to medium, light- to medium-brown; contains yellow to brown clay	11.5	34.5
Gravel, fine to medium, gray to pink to tan	8.5	43
Gravel, medium to coarse, gray to pink to tan	46.2	89.2
Chadron formation:		
Clay, pink	3.8	93
Clay, pink and blue	10	103

B10-49-23cc

[Sample log of test hole 18 feet east and 10 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 765 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	58	58
Gravel, medium to coarse, pink to tan	50	108
Gravel, fine to medium, pink to tan	1.5	109.5
Gravel, medium to coarse, pink to tan	13.5	123
Gravel, medium to coarse, pink to tan; contains reworked tan Brule siltstone	20	143
Gravel, fine, pink to tan, and brown, coarse sand and clay	10	153
Gravel, fine to medium, pink to tan, interbedded with light-tan clay	10	163
Sand, fine and very fine, and tan clay	7	170
Clay, sandy, blue	3	173
Clay, blue to blue-gray	17	190
Gravel, medium to coarse; contains chips of blue clay	18	208
Pierre shale:		
Shale, black to bluish-black	6	214

B10-49-26bc

[Sample log of test hole 25 feet east of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 802 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	8	8
Clay, sandy, brown	5	13
Sand, medium to fine, and dark-brown clay	10	23
Clay, interbedded with fine to coarse gravel and fine to coarse sand, light-tan	20	43
Sand, very fine to fine, interbedded with clay, tan to brown	40	83
Sand, very fine to coarse, and fine gravel, interbedded with light-tan clay	20	103
Sand, very fine to coarse, interbedded with tan clay	12.5	115.5
Clay, sandy, white to light-tan	3.7	119.2
Gravel, medium to coarse, pink to tan	10.8	130
Clay, sandy, tan	3	133
Gravel, medium to coarse, pink to tan	20	153
Gravel, very fine to fine, and coarse sand	30	183
Gravel, fine to coarse	51.5	234.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-49-26bc—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Clay, yellow to brown with dark-gray streaks	9.5	244
Shale, blue to black	6	250

B10-49-26cc

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,875 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium; contains clay; light-brown	33	33
Sand, fine to coarse; contains clay; tan	30	63
Sand, coarse, and very fine to fine gravel, pink to tan	10	73
Sand, fine to medium; contains some coarse sand; tan	30	103
Gravel, fine to medium, and sand; tan	40	143
Sand, medium to coarse, and very fine gravel	20	163
Sand, fine to coarse, tan	10	173
Gravel, fine to medium, interbedded with light-tan to buff clay	16	189
Clay, sandy, light-tan to buff	19	208
Gravel, fine to medium, pink to tan	6	214
Pierre shale:		
Shale, blue to black	9	223

B10-50-16cc

[Sample log of test hole 20 feet east and 20 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,845 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, cemented, very hard	3	3
Gravel, fine to medium, pink to tan	4	7
Gravel, fine to medium, pink to tan; contains reworked green clay	3	10
Chadron formation:		
Clay and siltstone, green	23	33
Clay and siltstone, green; contains some very fine to medium grained pink to tan gravel	12.5	45.5
Clay, light-blue	7.5	53

B10-50-28bd

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,778 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, dark-brown	4	4
Clay, light-tan	4.5	8.5
Sand, medium to coarse, gray to pink to tan	4.5	13
Gravel, fine to medium, light-gray	3.5	16.5
Gravel, medium, pink to tan	8.5	25
Gravel, fine to very fine, and coarse to medium sand, pink to tan	8	33
Gravel, medium to coarse, pink to tan	10.7	43.7
Pierre shale:		
Shale, black; contains some fine- to medium-grained, light-brown sand	6.3	50

B10-50-29aa

[Sample log of test hole 64 feet west and 356 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,821 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to very fine, light-brown	4	4
Gravel, medium, pink to tan	11.5	15.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-50-29aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	0.8	16.3
Gravel, coarse, pink to tan	3.7	20
Chadron formation:		
Clay, white to light-gray	4	24
Clay, yellow to brown and mottled pink and blue	13	37
Clay, mottled pink and blue	9	46
Clay, light-blue	42	88
Pierre shale:		
Shale, blue to black	5	93

B10-50-33ab

[Sample log of test hole 500 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,778 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, tough, black	2	2
Clay, tan	4	6
Clay, black	2	8
Sand, medium to coarse, and fine gravel, pink to tan	4	12
Clay, interbedded with gravel, gray to tan	4	16
Gravel, medium to coarse, pink-tan to gray	24	40
Sand, very fine to fine, and medium to coarse gravel, tan	1.5	41.5
Gravel, medium, pink to tan	6.5	48
Sand, fine to medium; contains some coarse sand (cemented 48-48.5 feet)	3	51
Pierre shale:		
Shale, black	2	53
Limestone, dark-gray to black	3	56
Shale, sandy, black	4	60

B10-50-33bd

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,778 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, light-brown	3.5	3.5
Gravel, medium to coarse, pink to tan	13	16.5
Sand, medium to coarse, pink to tan to light-gray	3.5	20
Gravel, fine to medium, pink to tan	3	23
Gravel, medium to coarse, pink to tan	10	33
Gravel, very fine to medium, pink to tan	17.5	50.5
Clay, silt, and very fine sand, greenish-gray	2.5	53
Chadron formation(?):		
Clay, blue	10	63
Pierre shale:		
Shale, blue to black	10	73

B10-50-33dc

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,782 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown to pink	4	4
Clay, tan	3.5	7.5
Gravel, medium to coarse, pink to tan	22	29.5
Clay, sandy, interbedded with medium to coarse gravel, brown to pink	10	39.5
Gravel, medium, pink to tan (cemented 58-59 feet)	19.5	59
Gravel, very coarse, and pebbles, pink to tan	4	63

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

LOGAN COUNTY, COLO.—Continued

B10-50-33dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay, sandy, light-gray, interbedded with pink to tan medium gravel	8.5	71.5
Pierre shale:		
Shale, black	1.5	73

B11-48-26da

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 645 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay and silt, black	2	2
Clay and silt, tan	2	4
Clay and silt, black	3	7
Clay and silt, light grading to dark-blue	2	9
Clay and silt, black	2	11
Gravel, medium to coarse, pink to gray	8	19
Brule formation:		
Clay, silty, tan to light-brown	4	23

B11-48-36bb

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 648 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay and silt, tough, black	2	2
Clay and silt, medium- to dark-brown	1	3
Clay and silt, light-tan; contains calcareous nodules	4	7
Sand, medium to coarse, brown	2	9
Gravel, medium to coarse, pink to tan	11.9	20.9
Brule formation:		
Clay, silty, tan to light-brown	7.1	28

B11-48-36cc

[Sample log of test hole 375 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geolgocial Survey, 1949. Surface altitude, 3, 650 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium, and silt, yellow to brown to black	7	7
Gravel, medium to coarse, pink to brown	2	9
Clay, silty, blue to gray	4	13
Gravel, fine to medium, pink to tan to light-gray	5	18
Gravel, medium to coarse, pink to tan	15	33
Gravel, fine, and medium to coarse sand, light-brown to pink to tan	6	39
Brule formation:		
Clay, silty, tan	20	59
Clay, silty, light-gray to green	4	63

B11-49-34dd

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3, 721 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, black	2	2
Silt, tan	12	14
Gravel, medium	1	15
Clay, reworked, intermixed with gravel, green to blue	1	16
Chadron formation:		
Clay, green to blue	7	23

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.

B1-55-5dc

[Driller's log of irrigation well drilled by Adams Well Works, 1949]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, hard	7	7
Soil, sandy	4	11
Sand, fine	12	23
Gravel	5	28
Clay	.5	28.5
Gravel	3.5	32
Clay	4	36
Gravel	5	41
Clay	1	42

B1-55-6dd

[Sample log of test hole 69 feet north and 16 feet west of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,374 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand and clay	13	18
Clay and sand	8	26
Gravel	33	59
Pierre shale:		
Shale, fragmental	1	60
Shale, blue	5	65

B1-55-8cb

[Driller's log of test hole drilled by Adams Well Works, 1949]

Pleistocene and Recent deposits, undifferentiated:		
Soil, hard, sandy	7	7
Soil, hard, black	5	12
Clay	4	16
Soil, sandy, yellow	2	18
Clay	2	20
Sand, fine, yellow	2	22
Gravel and clay	20	42
Gravel, coarse	4	46
Clay	2	48
Gravel, medium	8	56
Clay	.5	56.5
Gravel	4.5	61
Clay	1	62
Gravel, coarse	4	66
Pierre shale:		
Shale	1	67

B1-55-9bb

[Sample log of test hole 54 feet east and 22 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,375 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	6	11
Clay and sand	7	18
Sand	8	26
Gravel	9	35

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-55-9bb—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Sandstone	1	36
Shale, fragmental	2	38
Shale, blue	2	40

B1-55-10bb

[Sample log of test hole 110 feet east and 21 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,412 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	10	16
Clay	5	21
Sand	6	27
Clay	18	45
Clay and gravel	4	49
Pierre shale:		
Shale, fragmental	5	54
Shale, blue	6	60

B1-55-11ba

[Sample log of test hole 268 feet east and 25 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,423 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	10	15
Sand, fine	4	19
Gravel, sand, and clay	14	33
Pierre shale:		
Shale, fragmental	5	38
Shale, gray	3	41
Shale, blue	4	45

B1-55-12bb

[Sample log of test hole 188 feet east and 18 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,446 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	7	7
Sand, fine	7	14
Clay	14	28
Gravel	3	31
Gravel, interbedded with strips of clay	6	37
Pierre shale:		
Shale, fragmental	2	39
Shale, blue	1	40

B1-55-17dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Gravel	16	30
Clay	3	33

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-55-17dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel; contains strips of clay	15	48
Clay	4	52
Pierre shale:		
Shale	4	56

B1-55-30cd1

[Driller's log of irrigation well drilled by Oliver Well Works, 1937]

Pleistocene and Recent deposits, undifferentiated:		
Soil	25	25
Gravel, fine, and clay	45	70

B1-55-31aa

[Driller's log of test hole drilled by Oliver Well Works]

Pleistocene and Recent deposits, undifferentiated:		
Soil	25	25
Gravel	13	38
Clay	2	40
Gravel	4	44
Clay	2	46
Gravel	4	50
Clay	2	52
Gravel	4	56
Clay	2	58
Gravel	8	66
Pierre shale:		
Shale	1	67

B1-55-31ca

[Driller's log of irrigation well drilled by Adams Well Works, 1949. Surface altitude, 4,438.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	24	24
Gravel	12	36
Gravel, coarse	4	40
Clay	1	41
Gravel, coarse	8	49
Gravel and silt	2	51
Clay	.5	51.5
Gravel	3.5	55
Clay	1	56
Gravel	2	58
Gravel, coarse	4	62
Clay	2	64

B1-55-31dc

[Driller's log of test hole drilled by Oliver Well Works, 1925]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Gravel, fine to medium	15	29
Clay	1	30

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B1-55-31dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	15	45
Gravel and clay	10	55
Clay, hard	4	59

B1-56-1ac

[Driller's log of test hole drilled by Oliver Well Works, 1930. Surface altitude, 4,368.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	24	24
Gravel and fine sand	12	36
Gravel and clay	3	39
Gravel	3	42
Clay and gravel	6	48
Sand, fine, and clay	3	51
Gravel and sand	3	54
Clay and gravel	3	57
Gravel and streaks of sand	6	63
Gravel, fine	5	68

B1-56-1dc

[Driller's log of test hole drilled by Oliver Well Works. Surface altitude, 4,375 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Gravel	6	20
Clay	10	30
Gravel	7	37
Clay	2	39
Gravel	3	42
Clay	18	60
Gravel	9	69
Clay	1	70
Pierre shale:		
Shale	1	71

B1-56-1dd

[Driller's log of test hole drilled by Adams Well Works, 1948. Surface altitude, 4,373.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	27	27
Gravel	11	38
Gravel, coarse	6	44
Clay	1	45
Gravel	1	46
Clay	6	52
Gravel, medium	12	64
Clay	2	66

B1-56-2dd

[Sample log of test hole 195 feet west and 29 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,370 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	7	7

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B1-56-2dd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	10	17
Clay	13	30
Gravel	24	54
Gravel and clay	3	57
Gravel	14	71
Pierre shale:		
Shale, fragmental	4	75
Shale, blue	5	80

B1-56-3dd

[Sample log of test hole 590 feet west and 21 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4, 363 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	10	10
Clay	11	21
Clay and fine sand	8	29
Gravel, fine, and clay	8	37
Gravel and sand	6	43
Gravel	8	51
Clay and strips of gravel	6	57
Pierre shale:		
Shale, blue	3	60

B1-56-4dc

[Sample log of test hole 76 feet east and 17 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,388 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	15	21
Sand; contains some clay	7	28
Clay	14	42
Sand	1	43
Clay	8	51
Clay; contains trace of gravel	17	68
Pierre shale:		
Shale, fragmental, yellow	6	74
Shale, fragmental, gray	2	76
Shale, blue	4	80

B1-56-8bb

[Sample log of test hole 43 feet south and 27 feet east of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,463 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	7	7
Sand and clay	12	19
Clay	16	35
Pierre shale:		
Shale, fragmental	23	58
Sandstone(?)	1	59
Shale, yellow	30	89
Shale, gray	3	92
Shale, blue	8	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-56-11ab

[Driller's log of test hole drilled by Mr. Woberman, 1935. Surface altitude, 4,379 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and gravel	24	28
Gravel	28	56
Pierre shale:		
Shale	1	57

B1-56-12dd

[Driller's log of test hole drilled by Adams Well Works, 1939. Surface altitude, 4,387 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Clay	23	38
Gravel	2	40
Clay	7	47
Gravel	1	48
Clay	2	50
Gravel	6	56
Clay	1	57
Gravel	9	66
Sand, cemented	1	67

B1-56-13ad

[Driller's log of irrigation well drilled by Oliver Well Works, 1936. Surface altitude, 4,394.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	25	25
Gravel	6	31
Clay	1	32
Gravel	3	35
Clay	2	37
Gravel	5	42
Clay	4	46
Gravel	5	51
Clay	1	52
Gravel	4	56
Clay	5	61
Gravel	3	64
Pierre shale:		
Shale	1	65

B1-56-31a

[Driller's log of test hole drilled by Oliver Well Works, 1936]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	28	28
Gravel	5	33
Clay, blue	7	40
Gravel	4	44
Clay	5	49
Gravel	2	51
Clay	2	53
Clay and gravel	4	57
Gravel	3	60

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO. — Continued

B1-56-31a—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay and gravel	4	64
Pierre shale:		
Shale	1	65

B1-57-4bb

[Driller's log of domestic and stock well drilled by Canfield Drilling Co., 1947. Surface altitude, 4,432.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	20	20
Sand and clay	18	38
Gravel	22	60

B1-57-4cc

[Sample log of test hole 22 feet east and 30 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,453 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	10	16
Clay	3	19
Clay and sand	12	31
Clay	19	50
Clay; contains trace of gravel	4	54
Gravel	3	57
Pierre shale:		
Shale, blue	8	65

B1-57-11aa

[Sample log of test hole 10 feet south and 10 feet west of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,535 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	8	8
Clay	1	9
Sand and clay	15	24
Clay	15	39
Pierre shale:		
Shale, fragmental, yellow	19	58
Shale, blue	7	65

B1-57-15cc

[Driller's log of test hole drilled by Canfield Drilling Co]

Pleistocene and Recent deposits, undifferentiated:		
Clay	62	62
Gravel	4	66
Gravel and clay	12	78
Pierre shale:		
Shale	2	80

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-58-1dd

[Sample log of test hole 40 feet north and 20 feet west of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,500 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	13	17
Clay	32	49
Pierre shale:		
Shale, fragmental	7	56
Shale, gray	3	59
Sandstone	1	60
Shale, gray and yellow	12	72
Shale, blue	8	80

B1-58-2cc

[Sample log of test hole 12 feet east and 55 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,604 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Loam, heavy	8	14
Clay	15	29
Pierre shale:		
Shale, fragmental	19	48
Shale, fragmental; contains gypsum	3	51
Shale, gray	25	76
Shale, blue	4	80

B1-58-4cc

[Sample log of test hole 22 feet east and 40 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,638 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	4	8
Clay, black	5	13
Sand	3	16
Sand and clay	3	19
Sand	10	29
Sand and clay	3	32
Gravel, sand, and clay balls	7	39
Pierre shale:		
Shale, blue	11	50

B1-58-9cc

[Driller's log of irrigation well drilled by Canfield Drilling Co. Surface altitude, 4,653.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	4	9
Sand and clay	15	24
Clay	9	33
Gravel	5	38
Pierre shale:		
Shale	2	40

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-58-18ca

[Driller's log of seismograph shot hole drilled by Carter Oil Co., 1949. Surface altitude, 4,774 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	30	30
Clay, sandy	40	70
Pierre shale:		
Shale	20	90

B1-58-29cc

[Driller's log of seismograph shot hole drilled by Carter Oil Co., 1949. Surface altitude, 4,693 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	30	30
Sand and gravel	8	38
Pierre shale:		
Shale	42	80

B1-58-30cc

[Driller's log of seismograph shot hole drilled by Carter Oil Co., 1949. Surface altitude, 4,754 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	25	25
Clay	40	65
Pierre shale:		
Shale	15	80

B1-59-1dd

[Sample log of test hole 32 feet west and 22 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,745 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	10	16
Clay	22	38
Clay, soft, white	6	44
Clay	3	47
Fox Hills sandstone:		
Shale, fragmental, yellow	30	77
Shale, gray and yellow	10	87
Pierre shale(?):		
Shale, blue	13	100

B1-59-4cc

[Sample log of test hole 620 feet east and 24 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,663 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	14	19
Sand and clay	5	24
Clay	9	33
Clay and sand	31	64

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-59-4cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	3	67
Gravel, cemented	2	69
Gravel and cobbles	30	99
Sand, cemented	1	100
Pierre shale:		
Shale, blue	5	105

B1-59-5cc

[Sample log of test hole 135 feet east and 17 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4, 675 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	6	12
Clay and sand	8	20
Gravel	11	31
Sand and clay	7	38
Gravel, sand, and clay	3	41
Clay and fine sand	3	44
Clay, blue	15	59
Clay and some sand	8	67
Gravel and fine sand	7	74
Clay and sand	15	89
Gravel, sand, and some clay	12	101
Gravel, fine	13	114
Gravel	9	123
Pierre shale:		
Shale, yellow	3	126
Shale, blue	9	135

B1-59-6cb

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4, 687.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand	23	25
Gravel and sand	13	38
Gravel	10	48
Clay	11	59
Gravel, sand, and clay	8	67
Gravel and sand	9	76
Gravel and clay	4	80
Gravel	30	110
Fox Hills sandstone:		
Shale	6	116

B1-59-7bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4, 697.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Soil, sandy	10	15
Sand	20	35
Sand, coarse	7	42
Sand	18	60
Clay and sand	12	72

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-59-7bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel and clay	11	83
Gravel	17	100
Gravel, iron-stained	14	114
Pierre shale:		
Shale	6	120

B1-59-7cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,698 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay	8	16
Sand	4	20
Clay and strips of sand	50	70
Clay and gravel	10	80
Gravel, fine	8	88
Gravel and sand	24	112
Pierre shale:		
Shale	3	115

B1-59-8ca

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentaited:		
Soil	6	6
Clay, black	5	11
Gravel	13	24
Gravel and sand	8	32
Clay and gravel	19	51
Gravel	3	54
Clay, black, and gravel	28	82
Gravel and clay	15	97
Clay	6	103
Clay and gravel	24	127
Gravel	2	129
Clay and sand	3	132

B1-59-10aa

[Sample log of test hole 18 feet west and 55 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,771 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand and clay	7	13
Clay	51	64
Clay and sand	4	68
Gravel and clay	2	70
Gravel	6	76
Fox Hills sandstone:		
Shale, yellow	18	94
Shale, sandy, blue	6	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-59-17bd

[Driller's log of test hole]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	20	20
Sand	1	21
Clay	10	31
Sand	1	32
Clay, yellow	67	99
Sand	2	101
Pierre shale:		
Shale	1	102

B1-59-18cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,708 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay	6	14
Sand	16	30
Clay and sand	12	42
Sand, fine	15	57
Clay and fine sand	13	70
Gravel, fine	10	80
Clay	3	83
Sand, fine	10	93
Gravel, fine	7	100
Fox Hills sandstone:		
Shale	100	200

B1-59-19dd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,721.9 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Clay	4	11
Sand	2	13
Gravel	34	47
Clay	1	48
Gravel	4	52
Sand	18	70
Clay	8	78
Gravel	21	99
Pierre shale:		
Clay	1	100
Shale	2	102

B1-59-20cc

[Driller's log of irrigation well drilled by Canfield Drilling Co. Surface altitude, 4,715.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Clay	4	11
Sand	2	13
Gravel	34	47
Clay	1	48
Gravel	4	52

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-59-20cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	18	70
Clay	8	78
Gravel	21	99
Clay	1	100

B1-59-21a

[Driller's log of test hole drilled in 1935]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	25	37
Clay, soft	2	39
Sand	21	60
Clay	35	95
Sand	3	98
Sand and clay, cemented	7	105
Sand	1	106
Clay, blue	3	109
Clay, yellow	4	113
Gravel	4	117
Pierre shale:		
Shale	2	119

B1-59-30ba

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,726.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	8	12
Sand and gravel	9	21
Sand, gravel, and clay	85	106
Gravel	10	116
Pierre shale:		
Shale	24	140

B1-59-32

[Driller's log of test hole drilled by Oliver Well Works, 1930]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	40	46
Clay	4	50
Sand, fine	1	51
Clay	11	62
Sand, fine	8	70
Clay	10	80
Clay and gravel	7	87
Gravel	7	94
Clay, blue	6	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-1da

[Driller's log of test hole drilled by Canfield Drilling Co., 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	9	9
Gravel	29	38
Clay, blue	11	49
Gravel and sand	8	57
Gravel and clay	5	62
Gravel	49	111
Pierre shale:		
Shale	1	112

B1-60-2cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1935. Surface altitude, 4,700.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand, dirty	13	25
Clay	2	27
Sand	8	35
Gravel	15	50
Clay	4	54
Sand and silt	4	58
Sand	12	70
Gravel	2	72
Fox Hills sandstone:		
Shale	8	80

B1-60-3dd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,701 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	1	1
Gumbo	5	6
Sand and clay	11	17
Gravel, sand, and clay	11	28
Gravel	6	34
Gravel and clay	10	44
Gravel, sand, and clay	10	54
Gravel, sand, and silt	7	61
Gravel, coarse, and silt	7	68
Fox Hills sandstone:		
Shale	6	74

B1-60-4a

[Driller's log of stock well drilled in 1920]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay and sand	54	60
Gravel	30	90
Fox Hills sandstone:		
Shale; contains clam and snail shells	210	300

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-4dd

[Sample log of test hole 85 feet west and 21 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,793 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	16	21
Laramie formation:		
Shale, light-blue	5	26
Shale, yellow and gray	7	33
Fox Hills sandstone:		
Oyster shells	8	41
Shale, gray	10	51
Sandstone, brown	27	78
Shale, gray	7	85

B1-60-6dd

[Sample log of test hole 55 feet west and 23 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,753 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay and sand	30	35
Clay and gravel	2	37
Gravel	2	39
Clay	8	47
Clay, gravel, and sand	11	58
Fox Hills sandstone:		
Sand and sandstone	6	64
Shale	6	70

B1-60-8aa

[Sample log of test hole 40 feet west and 26 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,710 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay and sand	30	30
Fox Hills sandstone:		
Oyster shells	5	35
Shale, blue	5	40

B1-60-11aa

[Sample log of test hole 538 feet west and 95 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,693 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Gravel and sand	46	50
Clay and sand	6	56
Clay and gravel	7	63
Gravel, coarse, and sand and clay	25	88
Pierre shale:		
Shale, blue	7	95

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-11ad

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,700.6 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	5	9
Gravel and sand	12	21
Gravel, sand, and clay	18	39
Gravel	16	55
Gravel and coarse sand	17	72
Gravel	8	80
Clay and fine sand	10	90
Gravel and some clay	4	94
Gravel and cobbles	12	106
Pierre shale:		
Shale	7	113

B1-60-11cd

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1945. Surface altitude, 4,709.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand	8	18
Clay	3	21
Sand	7	28
Clay	4	32
Sand	18	50
Gravel	35	85
Sandstone(?)	2	87
Gravel	3	90

B1-60-12bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1943. Surface altitude, 4,706.9 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	60	65
Gravel, coarse	14	79
Sand, cobbles, and clay	1	80
Sand and clay	15	95
Sand, gravel, and cobbles	17	112
Pierre shale:		
Shale	8	120

B1-60-13bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,721 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	9	14
Clay	1	15
Sand	15	30
Gravel	10	40
Clay and sand	27	67
Gravel	13	80
Clay and sand	10	90
Gravel	10	100

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-13bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentaited—Continued		
Sand, fine	4	104
Gravel	13	117
Pierre shale:		
Shale, brown	5	122
Shale, blue	12	134

B1-60-13cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,723.5 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand and silt	37	40
Sand and clay	16	56
Gravel and sand	8	64
Sand and clay	28	92
Gravel and clay	6	98
Gravel	20	118
Pierre shale:		
Shale	2	120

B1-60-15cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Sand, coarse	26	40
Sand, fine	10	50
Gravel, corase, and sand	39	89
Conglomerate(?)	13	102
Fox Hills sandstone:		
Shale	38	140

B1-60-22dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1945. Surface altitude, 4,741.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Soil, heavy	10	12
Sand and gravel	8	20
Sand, fine	25	45
Sand, fine, and silt	15	60
Sand	12	72
Gravel; contains carbonaceous material	8	80
Clay, gravel, and sand	10	90
Fox Hills sandstone:		
Shale	1	91

B1-60-23cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1938. Surface altitude, 4,744.0 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	12	16
Clay	2	18

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-23cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine	7	25
Sand, coarse	15	40
Clay	20	60
Sand, coarse	15	75
Sand, silt, and carbonaceous wood	3	78
Gravel	12	90
Gravel and cobbles	5	95
Fox Hills sandstone:		
Shale	5	100

B1-60-27db

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,760.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	6	10
Sand and gravel	26	36
Clay and fine sand	13	49
Clay and coarse dirty sand	12	61
Gravel, coarse	15	76
Gravel, coarse, and some clay	3	79
Sand, coarse, and some clay	5	84
Gravel	11	95
Fox Hills sandstone:		
Shale	20	115

B1-60-27dc

[Driller's log of test hole drilled by Oliver Well Works, 1943. Surface altitude, 4,763.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and silt	8	12
Clay	3	15
Sand and silt	17	32
Clay, sandy	42	74
Sand and silt	4	78
Clay	6	84
Sand and silt	14	98

B1-60-28dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,768.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	12	14
Sand and gravel	13	27
Gravel	33	60
Sand and coal	5	65
Gravel	15	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-33ac

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1946. Surface altitude, 4,772.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand	5	20
Gravel, fine	20	40
Gravel	20	60
Gravel; contains fine sand and silt	10	70
Gravel	19	89

B1-60-33bd

[Driller's log of test hole drilled by Canfield Drilling Co]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	9	13
Sand	17	30
Gravel	50	80
Laramie formation:		
Shale	10	90

B1-60-33dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1944. Surface altitude, 4,787.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand, blue	3	10
Sand, blue, and clay	8	18
Clay and sand	19	37
Gravel, fine	11	48
Clay, blue, and gravel	22	70
Sand, blue	6	76
Gravel	24	100

B1-60-34cd

[Driller's log of test hole drilled by Canfild Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	3	10
Sand, fine	10	20
Sand	10	30
Gravel	7	37
Clay; contains strips of sand	23	60
Sand, fine	5	65
Gravel	20	85
Gravel and silt	10	95
Fox Hills sandstone:		
Shale	5	100

B1-60-35

[Driller's log of test hole drilled by Mr. Hoyt, 1936]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B1-60-35—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	32	36
Clay	2	38
Sand and gravel	5	43
Clay	26	69
Gravel	31	100

B2-55-3ab

[Driller's log of stock well drilled in 1916. Surface altitude, 4,475 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	5	8
Sand	17	25
Caliche	2	27
Clay, yellow	3	30
Gravel	15	45

B2-55-6dc

[Sample log of test hole drilled by Canfield Drilling Co., 1948. Surface altitude, 4,378 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine and very fine, and silt	28	28
Pierre shale:		
Clay, massive, tan to green	13	41
Shale, silty, tan to brown to blue	9	50

B2-55-8db

[Driller's log of stock well drilled by Adams Well Works, 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	5	5
Sand, fine, white	3	8
Clay, soft	1	9
Sand, yellow	10	19
Sand, fine, dirty	4	23
Clay	13.5	36.5

B2-55-11cd

[Driller's log of domestic well drilled in 1915. Surface altitude, 4,500 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	5	8
Sand	17	25
Caliche	2	27
Clay, yellow	2	29
Gravel	16	45

B2-55-12

[Driller's log of stock well drilled in 1918]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-55-12—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine to medium	11	14
Sand, coarse	16	30
Gravel	15	45

B2-55-16

[Driller's log of stock well drilled in 1918]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	5	8
Sand	17	25
Caliche	1	26
Clay, yellow	3	29
Gravel	16	45

B2-55-18ac

[Driller's log of test hole drilled by Adams Well Works]

Pleistocene and Recent deposits, undifferentiated:		
Soil	17	17
Gravel, coarse	14	31
Clay	2	33
Gravel, coarse	13	46

B2-55-19db

[Driller's log of irrigation well drilled by Adams Well Works, 1943. Surface altitude, 4,334.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gumbo and clay	4	4
Clay and gravel	3	7
Gravel and layers of clay	28	35

B2-55-21ba

[Driller's log of stock well drilled by Canfield Drilling Co., 1947. Surface altitude, 4,270 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand and clay	18	18
Clay	8	26
Clay and fine sand	5	31
Clay and gravel	4	35
Pierre shale:		
Shale, fragmental	9	44
Shale	2	46

B2-55-24bb

[Driller's log of domestic well drilled in 1916. Surface altitude, 4,505 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand, white	17	20
Clay, yellow	11	31
Sand, coarse	14	45

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-55-24bb—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale, blue	5	50
Shale	70	120

B2-55-30bc3

[Driller's log of test hole drilled by Oliver Well Works, 1929. Surface altitude, 4,343.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	17	17
Sand, fine	8	25
Gravel	14	39
Clay	4	43
Gravel	14.5	57.5

B2-55-31ca

[Driller's log of irrigation well drilled by Adams Well Works, 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, gravel, and clay	69	69

B2-56-1dd

[Driller's log of test hole drilled in 1930. Surface altitude, 4,297.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand, fine	3	13
Gravel	43	56

B2-56-2bb

[Sample log of test hole drilled for Town of Brush, 1949. Surface altitude, 4,294 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium and coarse, tan	30	30
Gravel, medium and fine, and some cobbles, pink to tan	5	35
Clay, tough, mottled black and tan	10	45
Silt, some fine sand, gray and tan	6	51
Clay, tough, tan	.5	51.5
Gravel, medium, pink	16.5	68
Silt, clay, and fine sand, yellow to tan	4	72
Silt and fine sand, light-tan	2	74
Pierre shale:		
Shale, tough, sandy, black	2	76

B2-56-6cc

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,456 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine, well-sorted, calcareous, tan	43	43
Clay; contains fine sand; plastic, calcareous, mottled yellow to gray	4	47
Pierre shale:		
Siltstone, indurated, calcareous, brown	3	50
Sandstone, fine, indurated, calcareous, tan to gray	2	52
Shale, sandy, calcareous, yellow; contains gypsum in lower part	36	88
Shale, laminated, firm, blue	2	90

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B2-56-10ab

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,304 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, silty, fine to medium, tan to gray	26	26
Clay, sandy, plastic, tan to brown	10	36
Gravel, coarse to fine; contains fine sand; tan to brown	52	88
Clay, calcareous, orange to tan	4	92
Pierre shale:		
Shale, laminated, firm, blue to gray; contains fine sand	3	95

B2-56-11dc

[Driller's log of test hole drilled by Adams Well Works. Surface altitude, 4,310 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Soil and fine sand	4	12
Sand, fine	6	18
Clay, tough	12	30
Clay, blue	1	31
Gravel, coarse	1	32
Gravel, rusty	7	39
Clay	2	41
Gravel, coarse, clean	13	54
Clay	1	55
Gravel, medium	4	59
Clay	1	60
Gravel, coarse	6	66
Clay	1	67

B2-56-12bb

[Driller's log of test hole drilled by Adams Well Works, 1948. Surface altitude, 4,303.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, black	10	10
Clay and fine sand	14	24
Clay and silt	5	29
Gravel	9	38
Clay	4.5	42.5
Gravel	12.5	55
Clay	1	56
Gravel	5	61
Clay	4	65
Clay and silt, blue	3	68
Sand, fine	6	74
Pierre shale:		
Shale	1	75

B2-56-12cd

[Driller's log of test hole drilled by Adams Well Works, 1941. Surface altitude, 4,308.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Soil, yellow	5	10
Soil, sandy	3	13
Gravel and silt	3	16
Clay	2	18
Gravel and silt	9	27

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-56-12cd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, coarse, and silt	5	32
Gravel, medium	7	39
Gravel and silt	2	41
Gravel, coarse	6	47
Gravel and silt	3	50
Clay, tough	1	51
Gravel	11	62

B2-56-13bb

[Driller's log of test hole drilled by Adams Well Works, 1943. Surface altitude, 4,320 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, black	4	4
Soil, light	4	8
Soil, black	5	13
Soil, sandy	4	17
Sand, fine	5	22
Sand	15	37
Gravel, coarse	10	47
Clay, yellow	1	48
Sand, fine	6	54
Gravel, coarse	6	60
Clay	1	61
Gravel and clay	5	66
Clay, tough	1	67
Gravel, iron-stained; contains fine sand	4	71
Clay	1	72

B2-56-18

[Driller's log of stock well drilled in 1912]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay, yellow	10	14
Gravel	31	45

B2-56-24ca1

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,329.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand	15	30
Clay	6	36
Gravel	1	37
Clay	1	38
Gravel	12	50
Clay	2	52
Gravel	8	60
Pierre shale:		
Shale, weathered	2	62
Shale	1	63

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-56-24dd

[Driller's log of test hole drilled by Mr. Woberman, 1933. Surface altitude, 4,331.5 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Gravel, fine; contains thin strips of clay	51	63

B2-57-5bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude 4,360 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand, fine	24	30
Sand, medium	8	38
Clay and strips of sand	12	50
Sand	5	55
Clay	7	62
Sand	3	65
Gravel	9	74
Clay	1	75
Gravel	2	77
Clay	2	79
Clay and strips of gravel	11	90
Gravel	5	95
Clay	1	96
Gravel	6	102
Pierre shale:		
Shale	6	108

B2-57-6ba

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,360 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand	4	14
Clay	4	18
Clay and strips of sand	22	40
Sand	15	55
Clay	4	59
Sand	3	62
Sand and silt	33	95
Clay and sand	6	101
Clay	3	104
Gravel	1	105
Clay	1	106
Gravel	12	118

B2-57-6dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,370.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	16	20
Clay	30	50
Sand, interbedded with clay	4	54
Gravel and fine sand	4	58
Clay	3	61
Gravel	15	76

Logs of test holes, wells and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-57-6dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	2	78
Gravel	17	95
Clay	1	96
Gravel	14	110

B2-57-7ba

[Driller's log of domestic well drilled by Canfield Drilling Co., 1940. Surface altitude, 4,377 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Clay	8	15
Sand and clay	37	52
Gravel, coarse	11	63
Gravel and clay balls	12	75
Gravel, coarse	22	97
Pierre shale:		
Shale	3	100

B2-57-8cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1939. Surface altitude, 4,382.1 feet]

Pleistocene and Recent deposits undifferentiated:		
Soil	4	4
Sand	3	7
Clay	2	9
Sand	11	20
Clay	15	35
Sand, fine	4	39
Clay	1	40
Sand	2	42
Clay	10	52
Gravel	18	70
Clay	2	72
Gravel	6	78
Clay	2	80
Gravel	15	95
Clay	2	97
Gravel	8	105
Pierre shale:		
Shale	3	108

B2-57-20bd

[Driller's log of stock well drilled by Canfield Drilling Co. Surface altitude, 4,400 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	13	13
Sand, fine	6	19
Clay	2	21
Sand, fine	24	45
Clay	3	48
Clay and gravel	4	52
Gravel, coarse	18	70
Clay	4	74
Sand	2	76
Gravel	10	86

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-57-20bd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	3	89
Rock(?)	1	90
Clay	2	92

B2-57-20dc

[Driller's log of irrigation well drilled by Adams Well Works, 1948]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	8	14
Clay	3	17
Sand	.5	17.5
Clay	.5	18
Silt, yellow	1	19
Clay	2	21
Clay, sandy, yellow	13	34
Clay	13	47
Gravel, coarse	3	50
Clay	1	51
Gravel	11	62
Gravel, silty	4	66
Gravel	4	70
Cobbles	8	78
Gravel, cemented	.5	78.5
Gravel	2.5	81

B2-57-28b

[Driller's log of stock well drilled by Mr. Callon, 1926]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	30	42
Clay	2	44
Sand	10	54
Clay	1	55
Gravel	7	62

B2-57-29ac

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,415.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, tough	14	14
Sand	2	16
Clay	33	49
Gravel	14	63
Gravel and clay	9	72
Sand, fine, and gravel	6	78
Clay and gravel	3	81
Pierre shale:		
Shale, fragmental	4	85
Shale, blue	2	87

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-57-29dd

[Driller's log of test hole drilled by Canfield Drillling Co., 1947. Surface altitude, 4,421 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	9	14
Sand and clay	20	34
Clay	11	45
Gravel	9	54
Clay and gravel	3	57
Gravel	13	70
Sand and rock(?)	1	71
Pierre shale:		
Clay (weathered shale)	3	74
Shale	1	75

B2-57-30b

[Driller's log of stock well drilled by Mr. Callon, 1926]

Pleistocene and Recent deposits, undifferentiated:		
Sand	23	23
Clay	1	24
Sand	4	28
Pierre shale:		
Shale	2	30

B2-57-30c

[Driller's log of test hole drilled by Mr. Callon, 1926]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand	22	24
Clay	2	26

B2-57-32ca

[Driller's log of test hole drilled by Canfield Drilling Co., 1944. Surface altitude, 4,426.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	17	19
Sand, fine	6	25
Clay	12	37
Clay and some gravel	6	43
Gravel and silt	2	45
Clay	6	51
Gravel and silt	8	59
Pierre shale:		
Shale, fragmental	5	64
Shale	1	65

B2-58-6bd

[Driller's log of domestic well drilled in 1930]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	8	12

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-58-6bd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, coarse	28	40
Gravel, coarse	10	50

B2-58-16b

[Driller's log of stock well drilled in 1922]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	19	23
Sand	17	40
Clay and fine sand	15	55
Sand	20	75
Gravel	3	78
Clay	1	79

B2-58-21d

[Driller's log of stock well drilled by Mr. Clark, 1914]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand, fine	14	20
Sand, coarse	10	30
Gravel	15	45

B2-58-34cc1

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	47	52
Pierre shale:		
Shale	8	60

B2-59-1ab

[Driller's log of test hole drilled by Adams Well Works, 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, yellow	8	8
Soil, sandy, black	4	12
Sand, fine	3	15
Clay	2.5	17.5
Sand, fine	2.5	20
Clay	49	69
Sand, fine	1	70
Gravel and silt	4	74
Gravel, coarse	4	78
Gravel, very coarse	7	85
Clay	.5	85.5
Gravel, medium to coarse	1.5	87
Pierre shale:		
Shale	1	88

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-1ad

[Driller's log of test hole drilled by Adams Well Works, 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, hard, sandy	5	5
Sand, fine	3	8
Clay	3	11
Sand, fine	3	14
Clay, tough	3	17
Clay	3	20
Sand, fine	5	25
Sand, fine, and silt	23	48
Clay and fine sand	7	55
Gravel, coarse	3	58
Gravel, medium	4	62
Gravel, coarse	4	66
Clay, tough	2	68
Sand, fine, and silt	2	70
Gravel, medium	1	71
Gravel, coarse	7	78
Pierre shale:		
Shale	1	79

B2-59-1d

[Driller's log of test hole drilled in 1934]

Pleistocene and Recent deposits, undifferentiated:		
Soil	16	16
Clay	3	19
Sand	1	20
Sand, coarse	39	59
Clay	6	65
Gravel	7	72
Clay	3	75

B2-59-5dc

[Sample log of test hole 20 feet east and 30 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,588 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, coarse to fine, brown	5	5
Sand, medium, and fine gravel; tan to gray	20	25
Sand, fine to medium, tan to brown	5	30
Clay, plastic, calcareous, tan to yellow	45	75
Silt: contains fine sand; yellow to brown	9	84
Sand, fine, well-sorted, calcareous	11	95
Gravel, coarse to fine; contains coarse to medium sand, calcareous; tan to gray	14	109
Sand, fine to coarse, slightly calcareous; contains some clay; brown	4	113
Gravel, fine to coarse; contains coarse to medium sand; pink to tan	9	122
Pierre shale:		
Shale, compact, yellow to brown	8	130
Shale, laminar, soft, blue to gray	3	133

B2-59-6bd

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-6bd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	15	20
Gravel and sand	25	45
Sand and clay strips	16	61
Gravel and sand	20	81
Sand and carbonaceous material	8	89
Clay	16	105
Gravel and sand	9	114
Gravel	5	119
Gravel and rock	11	130
Clay	2	132
Gravel	12	144

B2-59-7bc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4, 616 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	8	12
Sand and gravel	17	29
Gravel and clay	15	44
Clay, fine sand, and silt	30	74
Clay and coarse sand	5	79
Gravel, silt, sand, and clay	10	89
Clay	6	95
Gravel, sand, and clay	14	109
Clay	4	113
Clay and coarse sand	3	116
Clay	21	137
Gravel, sand, and silt	4	141
Gravel	16	157
Pierre shale:		
Shale	10	167

B2-59-7da

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	12	14
Sand, fine	3	17
Sand	6	23
Clay	12	35
Gravel	9	44
Clay	2	46
Gravel	20	66
Gravel, coarse	6	72
Clay	5	77
Sand	13	90
Gravel	5	95
Clay	3	98
Rock(?)	1	99
Clay	26	125
Sand	7	132
Gravel, coarse	10	142

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-7dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1937. Surface altitude, 4,608 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	10	12
Sand	7	19
Clay	1	20
Sand and silt	10	30
Sand, coarse	42	72
Sand, fine	20	92
Gravel and sand	6	98
Gravel	2	100
Clay and gravel	32	132
Pierre shale:		
Shale	13	145

B2-59-9aa

[Sample log of test hole 30 feet west of northeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,608 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, tan to brown	43	43
Sand, fine, and clay; yellow to tan	18	61
Gravel, medium to coarse; contains sand, medium and coarse; tan to brown	12	73
Clay, plastic; contains silt, yellow to brown	22	95
Pierre shale:		
Shale, laminar, soft, blue to gray	5	100

B2-59-12aa

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,495 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, semiplastic, brown	9	9
Clay; contains silt, calcareous; tan to brown	10	19
Sand; contains silt and clay; tan to brown	8	27
Sand, fine to medium, tan	5	32
Clay; contains silt, plastic; gray to tan	35	67
Gravel, coarse to medium; contains coarse sand; tan to brown	9	76
Clay, tan to gray	6	82
Pierre shale:		
Shale, laminar, blue to gray	8	90

B2-59-17bd

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay	14	20
Sand	2	22
Clay	8	30
Sand and silt	8	38
Clay	7	45
Sand	7	52
Clay, sandy	68	120
Gravel	8	128
Pierre shale:		
Shale	7	135

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-18bc

[Driller's log of test hole drilled by Mr. Harshman, 1940. Surface altitude, 4,619.2 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand	37	52
Clay, blue	26	78
Sand	6	84
Sand, clay, and chalk	18	102
Sandstone and chalk	1	103
Sand and clay	35	138

B2-59-19bd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,634 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Clay	2	14
Sand, fine	2	16
Clay	1	17
Sand, fine to coarse	43	60
Clay	2	62
Sand, fine	8	70
Sand	2	72
Sandstone boulders	21	93
Sand	4	97
Sand, coarse	4	101
Pierre shale:		
Shale	1	102

B2-59-20cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,640.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	25	29
Clay and gravel	9	38
Clay and fine sand	13	51
Gravel, fine, and clay	12	63
Clay and sand	8	71
Clay	6	77
Sand	10	87
Clay	3	90
Gravel and rocks	16	106
Gravel, cemented	1	107
Gravel	2	109
Gravel, cemented	2	111
Gravel	2	113
Rock	1	114
Pierre shale:		
Shale, fragmental	2	116
Shale	9	125

B2-59-20db

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	11	11

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-20db—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	9	20
Sand	2	22
Clay	4	26
Sand	4	30
Gravel, fine	12	42
Clay	3	45
Gravel	1	46
Clay	6	52
Sand and clay	8	60
Gravel	7	67
Clay	13	80
Sand and clay	5	85
Clay	5	90
Sand and clay	6	96
Sand and gravel	12	108
Gravel, cemented	4	112

B2-59-21cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand and silt	18	20
Sand, fine	15	35
Clay	20	55
Clay and gravel	18	73
Clay and strips of sand	17	90
Sand	6	96
Gravel	12	108
Sand and gravel, cemented	2	110
Gravel	2	112
Sand and gravel, cemented	1	113
Gravel	14	127
Pierre shale:		
Shale	3	130

B2-59-29bc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,649.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	14	18
Gravel	27	45
Clay	2	47
Gravel and clay	2	49
Sand	5	54
Clay	2	56
Gravel, fine	17	73
Sand and clay	19	92
Gravel	6	98
Clay	12	110
Sand	18	128
Gravel and silt	6	134
Gravel and sand, cemented	2	136
Pierre shale:		
Shale	7	143

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-59-29dd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand, silty	6	11
Clay	5	16
Sand and gravel; contains silt	16	32
Sand, fine, and clay	9	41
Sand and strips of clay	18	59
Sand	5	64
Sand, silt, and clay	7	71
Clay	13	84
Clay and sand	10	94
Gravel	7	101
Gravel and sand, cemented	4	105

B2-59-30dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1944. Surface altitude, 4,658.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	7	14
Clay	5	19
Sand	16	35
Sand, coarse	8	43
Gravel and silt	12	55
Gravel, medium	30	85
Gravel, coarse	5	90
Clay, yellow	6	96
Gravel and fine sand	14	110
Sand, fine	4	114
Gravel, coarse	16	130
Gravel and cemented sand and gravel	7	137
Clay	1	138
Pierre shale:		
Shale	2	140

B2-59-31dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4, 673 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel and silt	22	28
Gravel	11	39
Clay and gravel	20	59
Sand and clay	5	64
Sand	4	68
Clay and sand	22	90
Boulders, sandstone	10	100
Clay and gravel	12	112
Gravel	8	120
Gravel and silt	6	126
Gravel	13	139
Pierre shale:		
Shale	1	140

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO. —Continued

B2-59-32cc1

[Driller's log of irrigation well drilled by Canfield Drilling Co. Surface altitude, 4,669.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand, clay, and silt	2	8
Clay	2	10
Sand and strips of clay; contains silt	13	23
Sand and strips of clay	14	37
Clay	5	42
Sand and strips of clay; contains silt	26	68
Sand, coarse	4	72
Sand and strips of clay	53	125
Gravel	5	130
Gravel, coarse	8	138
Pierre shale:		
Shale, weathered	1	139
Shale, blue	.5	139.5

B2-60-1bd1

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1945. Surface altitude, 4,603.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand, coarse	29	35
Clay and sand	12	47
Clay and strips of sand	28	75
Sand and clay balls(?)	10	85
Sand, compact, and clay	25	110
Clay and sand	5	115
Gravel and clay	3	118
Clay	20	138
Gravel, coarse, clean	10	148
Clay	4	152
Gravel, coarse, clean	20	172

B2-60-1dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,610.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	2	5
Sand	24	29
Sand, fine	26	55
Clay and sand	13	68
Gravel, dirty	4	72
Sand and clay	6	78
Gravel and sand	13	91
Sand	4	95
Gravel, fine	5	100
Sand, fine	14	114
Gravel	27	141
Gravel and strips of clay	6	147
Gravel and rocks	21	168
Pierre shale:		
Shale	2	170

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-60-2dd

[Sample log of test hole 154 feet west and 14 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,609 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	7	11
Sand	16	27
Clay	15	42
Clay and sand	11	53
Gravel, sand, and clay	10	63
Gravel and sand	12	75
Gravel, sand, and clay	15	90
Clay	11	101
Gravel, sand, and clay	10	111
Gravel and cobbles	44	155
Pierre shale:		
Shale, blue	5	160

B2-60-4dd

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1944. Surface altitude, 4,603.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	24	30
Gravel	15	45
Sand, fine	25	70
Gravel	10	80

B2-60-6bb

[Driller's log of test hole drilled by Holden and Holden, 1941. Surface altitude, 4,614.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	42	42
Sand, fine	8	50
Gravel	9	59
Clay	1	60
Gravel	6	66

B2-60-7aa

[Sample log of test hole 66 feet west and 60 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,619 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, and silt; dark-brown	6	6
Sand, fine, and clay; calcareous, tan to brown	3	9
Sand, fine; contains silt; tan to brown	14	23
Clay; contains silt and fine sand; tan	3	26
Gravel, coarse to medium; contains some clay, tan to gray	9	35
Pierre shale:		
Sandstone, hard, coarse; contains concretions; orange, brown	2	37
Shale, silty, soft, brown	7	44
Shale, firm, blue to gray	6	50

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B2-60-10dc

[Driller's log of test hole drilled by Mr. Holden, 1937. Surface altitude, 4,615.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand and strips of clay	6	11
Clay	2	13
Sand	40	53
Sand, fine to coarse	12	65
Sand, fine	13	78
Clay	1	79
Sand and clay	9	88
Sand, fine to coarse	6	94
Sand, fine to medium	5	99
Pierre shale:		
Shale	1	100

B2-60-11dc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	11	11
Clay	4	15
Sand and clay	15	30
Sand	18	48
Sand, dirty	17	65
Gravel	9	74
Sand	7	81
Gravel	5	86
Clay	7	93
Gravel and clay	3	96
Cobbles	13	109
Clay	5	114
Pierre shale:		
Shale	2	116

B2-60-12bc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,620 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and gravel	16	20
Gravel, sandy	15	35
Gravel	12	47
Sand	12	59
Gravel and sand	2	61
Gravel	37	98
Gravel and sand	14	112

B2-60-12dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,620.2 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand and silt	20	25
Sand	23	48
Gravel	6	54
Clay	6	60
Sand	10	70

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-60-12dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, coarse, and silt	10	80
Gravel	15	95
Clay	13	108
Sand, cemented	2	110
Clay and cemented sand	8	118
Gravel	12	130
Gravel and pebbles	22	152
Cobbles	1	153
Pierre shale:		
Shale	7	160

B2-60-13cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,631 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	15	19
Gravel and sand	18	37
Gravel	9	46
Sand	11	57
Gravel and sand	5	62
Gravel	38	100
Gravel and sand	14	114
Gravel and clay	13	127
Pierre shale:		
Shale	8	135

B2-60-13dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Sand and silt	49	49
Clay	20	69
Clay, soft, black	2	71
Sand and silt	24	95
Sand, coarse	10	105
Gravel	4	109
Sand, cemented	1	110
Sand, medium and coarse; contains silt	10	120
Sand	9	129
Gravel	7	136
Clay, blue	4	140
Gravel and clay	6	146

B2-60-15dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	17	20
Sand	5	25
Clay	6	31
Sand and clay; contains silt	9	40
Sand and clay	7	47
Gravel and sand	15	62
Gravel	41	103

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B2-60-15dc—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale	7	110

B2-60-16da

[Driller's log of test hole drilled by Mr. Harshman]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand; contains layers of clay	27	30
Sand, medium	15	45
Sand, fine to coarse	11	56
Sand, fine to coarse, and pebbles	5	61
Clay; contains pebbles	3	64
Sand, fine to medium	3	67
Clay, sandy	10	77
Pierre shale:		
Sandstone and shells	1	78
Sandstone	3	81
Sandstone and shale	6	87
Shale, blue	3	90

B2-60-16dd

[Driller's log of test hole drilled by Mr. Harshman]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	1	4
Clay	6	10
Sand, fine to medium	33	43
Sand; contains 10 percent clay	10	53
Sand, fine to coarse	6	59
Clay	5	64

B2-60-22cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	12	16
Sand	14	30
Clay, sandy	5	35
Clay	10	45
Sand and silt	13	58
Gravel	10	68
Sand and silt; contains layers of clay	4	72
Clay, white	1	73
Sand and silt	3	76
Sand and gravel	4	80
Clay and sand	3	83
Sand	10	93
Clay and sand	4	97
Gravel	9	106

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-60-22dd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,643 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand, fine	23	25
Clay and sand	12	37
Clay	21	58
Sand	12	70
Gravel	37	107
Clay	1	108
Gravel	2	110
Pierre shale:		
Shale	5	115

B2-60-24dc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand	21	23
Clay and sand	9	32
Clay	18	50
Sand	5	55
Clay	10	65
Gravel and clay	10	75
Gravel and silt	5	80
Gravel	50	130
Pebbles and cobbles	3	133
Gravel and pebbles	2	135

B2-60-25dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,665.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	4	9
Sand	2	11
Gravel	8	19
Clay	2	21
Gravel	7	28
Clay	2	30
Gravel	8	38
Gravel, coarse	5	43
Clay	2	45
Gravel	24	69
Clay and sand	14	83
Gravel	13	96
Sandstone	1	97
Gravel	6	103
Clay	1	104
Gravel	14	118
Clay	1	119
Gravel, silty	1	120
Gravel	22	142
Pierre shale:		
Shale	3	145

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B2-60-26bd

[Driller's log of irrigation well drilled by Canfield Drilling Co. Surface altitude, 4,656.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay; contains silt	16	20
Sand	4	24
Clay	13	37
Sand, fine	33	70
Gravel and fine sand	35	105
Gravel, coarse	10	115

B2-60-27cd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,660 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	3	15
Clay	4	19
Sand and silt	10	29
Sand	9	38
Clay	2	40
Sand and silt	8	48
Clay	2	50
Sand and gravel, clean	16	66
Pierre shale:		
Shale	71	137

B2-60-33aa

[Driller's log of stock well drilled by Mr. Mitchell, 1912]

Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Clay	10	20
Sand	30	50
Clay	20	70
Fox Hills sandstone:		
Clay and sandstone	30	100
Clay, yellow	30	130
Slate(?)	1	131
Coal	1	132
Pierre shale(?):		
Slate and soft rock	13	145
Clay, dark, hard	35	180
Sand, white	38	218

B2-60-34aa

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,674 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand, fine	3	8
Clay	2	10
Sand and clay	30	40
Sand	4	44
Clay and sand	6	50
Gravel, fine	10	60
Clay and gravel	4	64
Gravel	8	72

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B2-60-34aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay and gravel	5	77
Gravel	7	84
Clay	8	92
Sand	9	101

B2-60-35cd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,681 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand, fine, and clay	20	30
Sand and gravel, fine	20	50
Clay	2	52
Gravel	38	90

B3-55-7dd

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,391 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, silty, fine to medium, and clay, tan	14	14
Clay, massive, uniform, tan to brown	4	18
Sand, very fine to medium, tan to brown	11	29
Clay, calcareous; contains very fine sand; cream to tan	8	37
Clay, calcareous, sandy, gray to brown	2	39
Pierre shale:		
Shale, weathered, uniformly bedded, tan, and brittle laminar blue shale	41	80

B3-56-2aa

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	10	15
Sand and clay	8	23
Gravel and clay	7	30
Gravel	7	37
Clay	11	48
Sand and clay, fine	4	52
Gravel	1	53
Clay	1	54
Gravel	2	56
Pierre shale:		
Shale	4	60

B3-56-3da

[Driller's log of public-supply well drilled for City of Brush. Surface altitude, 4,231.9 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to coarse	20	20
Sand, fine	40	60
Gravel, medium	15	85

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-5bc

[Driller's log of irrigation well drilled by Mr. Woberman, 1933. Surface altitude, 4,258.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	22	22
Sand, coarse	43	65
Gravel, coarse	20	85

B3-56-6cb

[Sample log of test hole 21 feet east and 95 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,265 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	5	9
Clay and sand	8	17
Gravel and sand	54	71
Gravel and sand; contains clay	5	76
Gravel and pebbles	37	113
Pierre shale:		
Shale, blue	7	120

B3-56-8bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1936. Surface altitude, 4,259.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay	10	18
Sand	2	20
Clay	5	25
Sand, coarse	25	50
Clay	2	52
Sand	4	56
Clay	2	58
Sand	2	60
Clay	2	62
Sand	18	80
Silt, black	1	81
Gravel	8	89
Pierre shale:		
Shale	2	91

B3-56-11cd

[Driller's log of test hole drilled by Adams Well Works, 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, hard	6	6
Soil, sandy	6	12
Sand	8	20
Clay	1	21
Gravel, fine	12	33
Gravel; contains silt	3	36
Gravel, medium	2	38
Gravel, coarse	10	48
Clay	.5	48.5
Gravel, coarse	7.5	56
Clay	1	57
Gravel, coarse	1	58

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B3-56-11cd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	1	59
Gravel; contains silt	2	61
Gravel, coarse	29	90
Pierre shale:		
Shale	1	91

B3-56-17ac

[Driller's log of test hole 200 feet south of northeast corner of quarter-quarter section, drilled by Canfield Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay; contains strips of sand	18	22
Sand	6	28
Sand, fine	5	33
Clay	1	34
Gravel	9	43
Clay	1	44
Sand, fine	8	52
Clay	2	54
Sand, fine	2	56
Clay	3	59
Gravel and sand	4	63
Clay	1	64
Gravel	3	67
Limestone	2	69
Sand, fine	2	71
Clay	9	80
Sand; contains strips of clay	20	100
Clay, sandy	19	119
Gravel; contains strips of clay	4	123

B3-56-18cc

[Sample log of test hole 25 feet east and 85 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,389 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	4	4
Sand and clay	7	11
Clay, hard	3	14
Clay and sand	2	16
Clay, hard	21	37
Pierre shale:		
Sandstone	2	39
Shale, yellow	21	60
Shale, blue	37	97

B3-56-21cc

[Driller's log of test hole drilled by Adams Well Works, 1948. Surface altitude, 4,315 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium and fine	38	38
Sand, coarse	6	44
Sand, coarse; contains fine gravel	5	49
Sand, medium	5	54
Sand, fine and medium	5	59

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-21cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, coarse and medium	25	84
Sand, fine	5	89
Pierre shale(?):		
Clay	5	94

B3-56-22ab

[Driller's log of test hole drilled by Adams Well Works, 1948. Surface altitude, 4,264 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand, fine; contains silt	6	18
Sand, fine	22	40
Clay	12	52
Gravel	9	61
Clay	4	65
Gravel	18	83
Clay	2	85
Pierre shale:		
Shale, yellow	1	86

B3-56-22cc

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,314 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium; contains some coarse sand	75	75
Clay	55	130

B3-56-22cd1

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,289 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine and medium	46	46
Clay	1	47
Sand, medium	1	48
Clay	17	65
Gravel	4	69
Clay	1	70
Gravel	19	89
Clay	1	90

B3-56-22cd2

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,285 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium	55	55
Gravel, fine to coarse	35	90
Pierre shale:		
Shale, blue to black	5	95

B3-56-22dc

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,282 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium	14	14

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B3-56-22dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, medium and coarse	21	35
Clay	30	65
Gravel, fine and medium	5	70
Gravel, medium and coarse	7	77
Pierre shale:		
Shale, blue to black	.5	77.5

B3-56-22dd

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,276 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium	14	14
Sand, medium and coarse	21	35
Clay	30	65
Gravel, fine and medium	5	70
Gravel, medium and coarse	7	77
Pierre shale:		
Shale, blue to black	.5	77.5

B3-56-24bd

[Driller's log of irrigation well drilled by Adams Well Works, 1948]

Pleistocene and Recent deposits, undifferentiated:		
Soil	11	11
Clay	11	22
Sand, fine	2	24
Clay	3	27
Sand, fine	10	37
Gravel	3.5	40.5
Clay	.5	41
Gravel, coarse and medium	7	48

B3-56-27aa

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,300 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine and medium	28	28
Sand, medium; contains 20 percent silt; black	22	50
Clay	22	72
Gravel, medium and coarse; contains thin layers of clay	30	102
Clay, blue and yellow	1	103
Gravel, coarse and medium	9	112
Pierre shale:		
Shale, blue to black	.5	112.5

B3-56-27ab1

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,316 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine and medium	72	72
Clay	16	88
Gravel, medium	.5	88.5
Clay	1.5	90

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-27ab1—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine and medium	1	91
Clay	1	92
Gravel, medium	8	100
Clay	2	102
Gravel, fine and medium	1	103
Clay	1.5	104.5
Gravel, medium and coarse	2.5	107
Clay	5	112
Gravel	2	114
Clay	1	115
Gravel, medium and fine	3	118
Pierre shale:		
Clay	19	137

B3-56-27ab2

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,293 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium and fine	8	8
Sand, medium and fine; contains 20 percent silt and clay	47	55
Clay; contains 30 percent fine sand	8	63
Gravel, medium and coarse	10	73
Clay	2	75
Gravel, fine to medium	10	85
Clay	11	96
Gravel, fine to medium; contains 30 percent silt	2	98
Pierre shale:		
Shale, blue to black	8	106

B3-56-27ac1

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,313 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium	56	56
Clay	19	75
Clay, compact, tough	2	77
Gravel, coarse	2	79
Clay	3	82
Gravel, fine and medium	3	85
Gravel, coarse	11	96
Gravel, medium	2	98
Clay	8	106
Gravel, coarse	6	112
Pierre shale(?):		
Clay, yellow	.5	112.5

B3-56-27ac2

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,305 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium	51	51
Clay	20	71
Sand, fine and medium, and clay	3	74
Gravel, fine to medium	6	80
Clay	.5	80.5
Gravel, fine to medium	3.5	84

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-27ac2—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	1	85
Gravel, medium; contains 20 percent silt and clay	1	86
Gravel, medium to coarse	6	92
Clay	13	105
Gravel, coarse	2	107
Clay	2	109
Gravel, fine to medium	3	112
Clay	1	113
Gravel, medium	1	114
Clay	2	116
Gravel, coarse	2	118
Pierre shale:		
Clay	1	119

B3-56-27ad

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,304 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to fine	45	45
Clay	11	56
Sand, fine	6	62
Clay	4	66
Sand, fine	2	68
Gravel, fine to medium	1	69
Clay	3	72
Sand, fine	6	78
Clay	2	80
Gravel, coarse	6	86
Clay	5	91
Gravel, coarse	3	94
Clay	14	108
Pierre shale:		
Shale, blue	.5	108.5

B3-56-27dd

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,290 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse	33	33
Clay	21	54
Gravel, fine and medium	9	63
Clay and silt	5	68
Gravel, fine to medium	12	80
Silt	10	90
Gravel, medium to fine	14	104
Pierre shale:		
Shale, blue to black	.5	104.5

B3-56-28cc

[Driller's log of test hole drilled by Adams Well Works, 1949. Surface altitude, 4,325 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to coarse	115	115
Clay	1	116

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-56-30bd

[Driller's log of stock well drilled by Canfield Drilling Co. Surface altitude, 4,405.5 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	27	27
Sand and clay	9	36
Clay	4	40
Sand and clay	21	61
Clay	41	102
Rocks	1	103
Clay	8	111
Pierre shale:		
Shale	29	140

B3-57-2db

[Driller's log of domestic well drilled by Canfield Drilling Co. Surface altitude, 4,277.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand, fine to coarse	42	50
Clay	2	52
Sand, fine	5	57
Clay	3	60
Sand, fine, interbedded with strips of clay	35	95
Clay, hard, blue	14	109
Gravel, fine, clean	11	120
Clay, yellow	1	121

B3-57-3cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1935. Surface altitude, 4,296.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand, fine, and fine gravel	70	85
Gravel, coarse	24	109

B3-57-4bd

[Driller's log of well drilled by Mr. Woberman, 1912]

Pleistocene and Recent deposits, undifferentiated:		
Soil	16	16
Sand and gravel	34	50
Gravel, pebbles, and cobbles	60	110

B3-57-7ba

[Driller's log of test hole drilled for City of Fort Morgan by Canfield Drilling Co., 1948]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	6	11
Sand	15	26
Gravel and sand	32	58
Gravel, sand, and clay	11	69
Gravel and sand	22	91
Gravel, sand, and lignite	8	99
Gravel and cobbles	12	111

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B3-57-7ba—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, cobbles, and clay	8	119
Gravel and cobbles	16.5	135.5
Clay	.5	136
Gravel	1	137
Clay	2	139
Gravel	1	140
Clay	.5	140.5
Gravel, cobbles, and clay	18.5	159
Gravel and cobbles	20	179
Pierre shale:		
Sandstone, brown to gray	3	182
Sandstone, blue, and silt	18	200

B3-57-12aa

[Sample log of test hole 67 feet west and 17 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4, 265 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	6	11
Sand and clay	8	19
Gravel and sand	20	39
Sand	8	47
Gravel and sand	19	66
Gravel, red	12	78
Gravel, red, and cobbles	26	104
Pierre shale:		
Shale, yellow	3	107
Shale, blue	2	109

B3-57-12cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,284 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	7	15
Clay, sandy	21	36
Sand	4	40
Sand, fine	10	50
Gravel, brown	2	52
Sand, fine	16	68
Gravel	4	72
Sand, fine	19	91
Gravel	7	98
Clay	2	100
Pierre shale:		
Shale	10	110

B3-57-13aa

[Sample log of test hole 54 feet west and 16 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,274 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	5	11
Sand and clay	10	21

Logs of test holes, wells and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-57-13aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	9	30
Sand, coarse, and clay	8	38
Pierre shale:		
Shale, yellow	8	46
Shale, blue to yellow	2	48
Shale, blue	1	49

B3-57-14bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,299 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	4	12
Clay	13	25
Sand	35	60
Clay	5	65
Sand	30	95
Clay	1	96
Gravel	9	105
Pierre shale:		
Shale	.5	105.5

B3-57-15cc

[Driller's log of test hole 500 feet north of the southwest corner of section, drilled by Canfield Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand, fine	20	35
Sand, coarse	5	40
Clay	2	42
Sand, fine	8	50
Sand, coarse	14	64
Clay	3	67
Sand, fine	8	75
Clay	3	78
Sand	7	85
Clay	3	88
Sand	7	95
Cobbles	.5	95.5
Sand, fine	2.5	98
Clay and rocks	5	103
Sand, fine	5	108
Pierre shale:		
Shale, fragmental	5	113
Shale, blue	3	116

B3-57-17ab

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,321.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	10	10
Sand, fine	20	30
Sand, coarse	10	40
Clay and sand	5	45
Sand and gravel; contains slight iron stain at 60 feet	15	60
Sand	10	70

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B3-57-18cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,333 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	8	13
Clay	3	16
Sand, coarse	7	23
Clay	1	24
Sand	3	27
Sand, cemented	2	29
Clay and strips of sand	41	70
Sand	3	73
Clay	2	75
Sand	5	80
Sand and gravel	6	86
Clay	2	88
Sand and gravel	9	97
Sand, gravel, and cobbles	1	98
Gravel, interbedded with strips of clay	5	103
Sand, cemented	14	117
Sand and gravel	13	130
Gravel, interbedded with strips of clay	10	140
Pierre shale:		
Shale	3	143

B3-57-19db

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,338.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	13	17
Sand and clay	40	57
Sand, fine, and clay	17	74
Clay and gravel	5	79
Gravel	1	80
Clay	7	87
Gravel	3	90
Clay	3	93
Gravel	7	100
Sand, fine	3	103
Gravel	15	118
Gravel and clay	2	120
Gravel	3	123
Gravel and clay	5	128
Gravel	20	148
Pierre shale:		
Shale, weathered	2	150
Shale	5	155

B3-57-20bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1939. Surface altitude, 4,333.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand, fine, and strips of clay	42	50
Clay, yellow	8	58
Sand	10	68
Clay, brown	11	79
Sand, fine, blue	21	100
Clay	3	103

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-57-20bb—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, medium to coarse	6	109
Clay	1	110
Sand and fine gravel	18	128
Pierre shale:		
Shale	.5	128.5

B3-57-20db

[Driller's log of test hole drilled by Canfield Drilling Co., 1939]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	11	19
Clay	4	23
Sand, fine to coarse	5	28
Clay	2	30
Sand	8	38
Clay	3	41
Sand	13	54
Clay	2	56
Sand, fine	4	60
Clay	2	62
Sand	2	64
Clay	1	65
Sand	3	68
Clay	2	70
Sand, coarse	5	75
Clay	1	76
Sand	4	80
Clay	1	81
Sand, clean	17	98
Clay	3	101
Gravel	2	103
Pierre shale:		
Shale	2	105

B3-57-29bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,339.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand, interbedded with strips of clay	46	50
Sand, fine	8	58
Clay	6	64
Gravel, fine	21	85
Clay, sandy	4	89
Gravel	7	96
Pierre shale:		
Shale	7	103

B3-57-29cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1935. Surface altitude, 4,344.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	5	10
Sand, fine	3	13
Clay	5	18

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B3-57-29cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine	47	65
Gravel	24	89
Clay	5	94
Pierre shale:		
Shale	.5	94.5

B3-57-34a

[Driller's log of test hole drilled by Mr. Callon, 1931]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand, fine	48	50
Sand and streaks of clay	35	85
Sand, coarse	2	87
Pierre shale:		
Shale, blue to gray	1	88

B3-58-1da2

[Driller's log of public-supply well drilled for City of Fort Morgan by Mr. Woberman, 1932]

Pleistocene and Recent deposits, undifferentiated:		
Sand	130	130
Clay	10	40
Gravel	102	242

B3-58-3ba

[Driller's log of test hole drilled by U. S. Bureau of Reclamation, 1948. Surface altitude, 4,369.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, and silt	45	45
Sand, fine to coarse, and silt	35	80
Sand, fine, and silt	30	110
Sand, coarse	20	130
Pierre shale:		
Shale	17	147

B3-58-3bb

[Driller's log of test hole drilled by U. S. Bureau of Reclamation. Surface altitude, 4,369 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, and clay	20	20
Sand, coarse	123	143
Pierre shale:		
Shale, blue	10	153

B3-58-4cb

[Driller's log of test hole drilled by U. S. Bureau of Reclamation, 1948. Surface altitude, 4,386 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand, fine; contains some clay	64	70

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-58-4cb—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, coarse	122	192
Sand, coarse; contains pebbles and cobbles	7	199
Pierre shale:		
Shale, brown	3	202
Shale, blue	9	211

B3-58-8cb

[Driller's log of test hole drilled by Canfield Drilling Co., 1937. Surface altitude, 4,407.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay and sand	12	15
Sand, coarse	23	38
Clay and sand	22	60
Sand, fine, dirty	50	110
Clay	20	130
Gravel, coarse, red	20	150
Clay	2	152
Gravel, coarse, red	11	163
Pierre shale:		
Shale	1	164

B3-58-10cb

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1944. Surface altitude, 4,383.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Clay	3	10
Sand	2	12
Gravel	34	46
Sand	11	57
Clay	4	61
Sand	7	68
Gravel	2	70
Sand	6	76
Clay	12	88
Gravel	9	97
Clay, blue	8	105
Gravel	25	130
Gravel and pebbles	70	200

B3-58-12cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1932. Surface altitude, 4,352.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand, medium and coarse	39	44
Sand, fine	15	59
Sand, coarse	16	75
Clay	2	77
Sand, fine, blue	6	83
Sand, medium and coarse	22	105
Gravel, fine	41	146

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B3-58-13ac

[Driller's log of test hole drilled by Canfield Drilling Co., 1937. Surface altitude, 4,348.6 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	10	10
Clay and sand	20	30
Sand, fine	20	50
Clay	7	57
Sand	13	70
Sand and strips of clay	10	80
Sand, fine to coarse, and fine gravel	20	100
Gravel and pebbles	20	120

B3-58-15bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	18	18
Clay	2	20
Clay, sandy	5	25
Sand	11	36
Clay and sand	4	40
Sand, fine to coarse	20	60
Sand, fine	20	80
Sand, fine, and clay	20	100
Sand, fine	12	112
Sand, coarse	11	123
Clay	5	128
Gravel	6	134
Clay, interbedded with strips of gravel	12	146
Gravel	17	163
Pierre shale:		
Shale	7	170

B3-58-15dd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,375 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	6	14
Clay	9	23
Sand, fine to coarse	4	27
Sand, fine	23	50
Clay	5	55
Sand, fine	15	70
Clay	20	90
Sand	9	99
Clay	6	105
Sand	2	107
Clay	7	114
Gravel, fine	3	117
Sand, cemented	3	120
Clay and sand	4	124
Sand	8	132
Pierre shale:		
Shale	11	143

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska — Continued

MORGAN COUNTY, COLO.—Continued

B3-58-18bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	4	9
Clay	2	11
Sand, fine to medium	23	34
Sand, coarse	9	43
Sand, fine	13	56
Clay	4	60
Sand, fine	13	73
Clay	6	79
Sand	16	95
Clay and sand	5	100
Clay, sandy	25	125
Clay	15	140
Pierre shale:		
Shale	1	141

B3-58-18cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	16	20
Clay, sandy	12	32
Sand, medium and coarse	10	42
Sand, fine	11	53
Clay	7	60
Sand, fine	20	80
Clay, blue	3	83
Sand, fine	3	86
Clay	4	90
Sand to gravel	24	114
Clay, sand, gravel, and pebbles	16	130
Gravel	6	136
Clay	2	138
Gravel	13	151
Pierre shale:		
Shale	1	152

B3-58-19ab

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,424.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	16	16
Sand, fine	18	34
Clay, sandy	6	40
Sand	5	45
Clay	13	58
Sand	2	60
Clay	30	90
Pierre shale:		
Shale	1	91

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO.—Continued

B3-58-21bc

[Driller's log of stock well drilled by Mr. Ambrose, 1947. Surface altitude, 4,402.2 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand, fine	20	30
Clay	2	32
Sand, fine	28	60
Clay	2	62
Sand, fine	18	80
Limestone	2	82
Sand, fine	18	100
Pierre shale:		
Shale, clayey	5	105
Shale, blue	1	106

B3-58-23cb

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,374.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	39	46
Clay and sand	6	52
Sand, fine	12	64
Clay	6	70
Pebbles and cobbles	1	71
Pierre shale:		
Shale, weathered	19	90

B3-58-24bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and strips of clay	108	108
Gravel	17	125
Clay	2	127
Pebbles and gravel	19	146
Clay	10	156
Gravel	2	158
Clay	2	160
Gravel, pebbles, and clay	25	185
Pierre shale:		
Shale, blue	1	186

B3-58-24dd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	8	20
Clay	5	25
Sand	5	30
Clay	3	33
Sand and strips of clay	57	90
Sand	9	99
Pebbles and clay	2	101
Gravel	2	103
Clay	5	108
Sand	3	111

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-58-24dd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	6	117
Gravel	3	120
Clay	2	122
Gravel	5	127
Pierre shale:		
Shale, blue and yellow	8	135

B3-58-26aa

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand, fine	4	10
Clay	5	15
Sand, fine	10	25
Clay	2	27
Sand, fine	4	31
Clay	7	38
Sand	8	46
Clay	18	64
Sand, fine	4	68
Clay	4	72
Sand, fine	9	81
Clay	17	98
Pierre shale:		
Shale	2	100

B3-58-31a

[Driller's log of stock well drilled by Mr. Dodge, 1918]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand, fine to medium	37	40
Sand, coarse	25	65
Gravel	12	77
Clay	18	95
Gravel	4	99
Clay	4	103
Gravel	17	120

B3-58-35da

[Sample log of test hole 108 feet west of northeast corner of quarter-quarter section and 300 feet north of irrigation ditch, drilled for U.S. Geological Survey, 1948. Surface altitude, 4,365 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine; contains silt; calcareous, tan to brown	3	3
Sand, medium to coarse, and clay, tan to gray	6	9
Sand, fine to medium; contains silt, some clay; light tan	8	17
Clay, sandy, tan to brown	28	45
Sand, fine to medium; contains silt; yellow to tan	18	63
Pierre shale:		
Shale; contains fine sand, calcareous, gray	3	66
Shale, calcareous, yellow to tan	6	72
Shale, laminar, firm, blue	3	75

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B3-58-36ad

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1947. Surface altitude, 4,350.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	6	9
Sand	8	17
Clay	2	19
Sand	3	22
Clay and fine sand	14	36
Sand, fine	20	56
Clay	5	61
Clay and fine sand	10	71
Gravel and clay	15	86
Pierre shale:		
Shale, fragmental	2	88

B3-59-9ab

[Sample log of test hole 60 feet west and 144 feet south of northeast corner of quarter-quarter section, drilled for the U. S. Geological Survey, 1947. Surface altitude, 4,461 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	5	5
Sand	6	11
Gravel and sand, dirty	20	31
Gravel, dirty; contains some clay	10	41
Sand, fine	18	59
Sand, very fine	29	88
Pierre shale:		
Shale, fragmental	13	101
Shale, blue	9	110

B3-59-16bb

[Sample log of test hole 98 feet south and 18 feet east of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,528 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	4	4
Sand	13	17
Sand; contains some clay	4	21
Gravel and fine sand	10	31
Sand, fine, and clay, hard	4	35
Pebbles, gravel, sand, and clay	27	62
Pierre shale:		
Shale, yellow and gray	5	67
Shale, black	3	70

B3-60-1cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,524.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand, fine to coarse	15	18
Sand, fine, and clay	39	57
Gravel and sand	18	75
Gravel, sand, and clay	7	82

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-1cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine, and sand	22	104
Gravel, sand, and clay	30	134
Gravel, red	30	164
Pierre shale:		
Shale, fragmental	5	169
Shale	11	180

B3-60-2ad

[Driller's log of test hole drilled by Mr. Harshman. Surface altitude, 4,521 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand and clay	61	61
Sand, medium	8	69
Clay	1	70
Sand, fine to medium	6	76
Sand, medium	21	97
Clay, and layers of sand	4	101
Sand, medium	5	106
Clay	2	108
Sand, medium	3	111
Clay	2	113
Sand, medium	15	128
Clay	1	129
Sand, medium	22	151
Cobbles and clay	2	153
Sand, fine to coarse; contains pebbles and cobbles	7	160
Cobbles	3	163
Pierre shale:		
Shale	1	164

B3-60-2cc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,534 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	60	60
Gravel	45	105
Clay	4	109
Sand, fine	4	113
Clay	2	115
Gravel	2	117
Clay	2	119
Clay, sandy, and strips of fine sand	13	132
Sand, fine	29	161
Gravel	15	176
Clay	4	180
Gravel, fine to medium	20	200
Gravel, coarse	11	211
Pierre shale:		
Shale	4	215

B3-60-3cc

[Driller's log of irrigation well drilled by Mr. Harshman 1936. Surface altitude, 4,531.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand	20	35

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-3cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay and sand	13	48
Sand, coarse	32	80
Clay	2	82
Sand, fine to coarse	45	127
Clay	3	130
Gravel, cemented	18	148
Gravel	7	155

B3-60-4ad

[Driller's log of irrigation well drilled by Mr. White, 1936. Surface altitude, 4,526.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	53	60
Clay	1	61
Sand	6	67
Clay	1	68
Sand and silt	7	75
Clay	3	78
Sand and silt	16	94
Sand, very fine to fine	10	104
Clay	1	105
Sand and silt	10	115
Sand and gravel	7	122
Clay	1	123
Sand and fine gravel	6	129
Clay, hard	8	137
Gravel	2	139
Clay	1	140
Gravel	10	150
Pierre shale:		
Shale	1	151

B3-60-5dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,528.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand	10	10
Gravel	6	16
Sand	24	40
Gravel and sand	14	54
Clay and fine sand	12	66
Sand and silt	12	78
Sand	6	84
Gravel	49	133
Pierre shale:		
Shale	7	140

B3-60-8dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,542.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and strips of clay	11	11
Sand and gravel	23	34
Gravel and sand	15	49
Gravel, sand, and silt	4	53

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-8dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	4	57
Clay and fine sand	27	84
Gravel and clay	4	88
Gravel	14	102
Sand and gravel	9	111
Gravel and clay	7	118
Gravel and sand	8	126
Gravel	13	139
Pierre shale:		
Shale	1	140

B3-60-9ca

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand, fine, and silt	23	25
Sand	41	66
Clay, sandy	9	75
Sand, fine, silty	8	83
Gravel	4	87
Clay	6	93
Sand and strips of clay	19	112
Sand and gravel	25	137
Pierre shale:		
Clay, yellow	2	139
Shale	5	144

B3-60-9dd

[Driller's log of test hole drilled by Mr. White, 1936. Surface altitude, 4,543.2 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	30	30
Sand	28	58
Clay	1	59
Gravel, coarse	13	72
Clay, hard	4	76
Sand and clay	22	98
Clay, hard	14	112
Sand, coarse	19	131
Sand, fine	7	138
Gravel	16	154

B3-60-10ac

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,535.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	17	21
Sand and clay	15	36
Sand and gravel	8	44
Gravel, fine to medium	31	75
Gravel, coarse	31	106
Gravel and sand	11	117
Gravel, sand, and cobbles	51	168
Gravel, sand, and clay	12	180

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B3-60-11ac

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,530 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand, fine to coarse	28	30
Clay	2	32
Sand, fine to medium	18	50
Sand, coarse	10	60
Gravel, fine to medium	28	88
Gravel, coarse	14	102
Gravel, fine	6	108
Sand, fine	14	122
Sand and silt	13	135
Clay	1	136
Gravel	11	147
Pierre shale:		
Shale	7	154

B3-60-13cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,557.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	12	20
Clay	2	22
Sand, fine	48	70
Clay	3	73
Sand, fine	7	80
Gravel, fine	8	88
Sand, fine	2	90
Gravel	18	108
Sand, fine	2	110
Gravel, fine	15	125
Clay and gravel	5	130
Gravel and silt	5	135
Gravel	6	141
Gravel, cemented	1	142
Gravel	3	145
Gravel, cemented	3	148
Gravel	4	152

B3-60-13dc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	3	3
Sand and silt	67	70
Clay	3	73
Sand, coarse	7	80
Sand, fine	15	95
Gravel, fine	13	108
Sand, fine	2	110
Gravel, fine, and silt	10	120
Sand, fine	10	130
Gravel and cobbles	20	150
Gravel	8	158
Pierre shale:		
Shale	2	160

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-15cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,554 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	26	30
Gravel and sand	5	35
Clay	5	40
Gravel, sand, and clay	22	62
Clay	4	66
Clay and sand	17	83
Sand	7	90
Sand and clay	7	97
Gravel, sand, and clay	11	108
Clay	10	118
Sand, clean	9	127
Gravel	8	135
Pierre shale:		
Shale	5	140

B3-60-16cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	3	8
Sand	15	23
Clay	5	28
Sand, coarse	4	32
Clay	2	34
Sand, coarse	11	45
Sand, fine to coarse	27	72
Clay	1	73
Sand, fine	17	90
Sand, fine to coarse, and fine to coarse gravel	52	142
Pierre shale:		
Shale	1	143

B3-60-18db

[Driller's log of test hole drilled by Mr. Holden, 1935]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand, fine to medium	27	29
Sand, coarse	9	38
Sand, coarse, and gravel	10	48
Sand, fine	23	71
Clay, hard	12	83
Sand	4	87
Clay, hard	16	103
Pierre shale:		
Shale	1	104

B3-60-20dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,571 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	8	8
Clay	4	12

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-20dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, coarse, rusty	4	16
Sand, clay, and silt	19	35
Gravel	25	60
Cobbles	1	61
Gravel, coarse	15	76
Sand	24	100
Gravel, coarse	30	130

B3-60-22ac

[Driller's log of irrigation well drilled by Oliver Well Works, 1937. Surface altitude, 4,561.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	50	56
Clay, soft	2	58
Gravel and silt	7	65
Sand and gravel	10	75
Clay	7	82
Sand and gravel	8	90
Clay	3	93
Gravel	4	97
Clay and sand	5	102
Sand and gravel	13	115
Clay, hard	6	121
Gravel	9	130
Clay, soft	2	132
Gravel	14	146

B3-60-24cd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,572.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	14	18
Sand and gravel	45	63
Gravel, fine	21	84
Sand, coarse	14	98
Gravel	6	104
Clay	10	114
Sand, fine	20	134
Sand, fine to coarse	20	154
Clay	2	156
Gravel	20	176
Clay	2	178

B3-60-24dd

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,565 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	30	30
Clay and sand	10	40
Sand and clay	4	44
Gravel, fine; contains sand and silt	6	50
Clay and sand	22	72
Gravel, iron-stained	4	76

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B3-60-24dd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	12	88
Sand, fine	20	108
Gravel, fine	6	114
Clay and gravel	4	118
Gravel and clay balls	5	123
Gravel, pebbles, and cobbles	5	128
Pierre shale:		
Shale, fragmental	12	140
Shale, blue	20	160

B3-60-25cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,583.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	9	14
Clay	4	18
Sand and clay	6	24
Sand	11	35
Clay and sand	10	45
Clay	5	50
Sand, fine, and clay	10	60
Sand and clay	12	72
Gravel and sand	16	88
Sand, fine	12	100
Sand, medium to coarse	10	110
Gravel, fine	22	132
Clay	8	140
Clay and fine sand	16	156
Gravel	6	162
Sand, fine	1	163
Gravel	11	174

B3-60-28ad

[Driller's log of irrigation well drilled by Mr. White, 1934. Surface altitude, 4,576.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	50	50
Sand, fine	40	90
Clay	2	92
Sand, coarse, and gravel	10	102
Clay	6	108
Gravel	4	112

B3-60-29ac

[Driller's log of test hole drilled by Mr. Harshman, 1946. Surface altitude, 4,580.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	1	1
Silt, clayey, black	6	7
Sand, fine to coarse	56	63
Clay	3	66
Sand, fine to medium, and pebbles	12	78
Sand, medium; contains layers of clay	7	85
Sand, fine to medium	8	93
Clay and cobbles	1	94

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-29ac—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine to medium	19	113
Pierre shale:		
Shale	1	114

B3-60-31cb

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,617.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	17	17
Sand and strips of clay	26	43
Clay	2	45
Gravel and sand	7	52
Clay	2	54
Sand	2	56
Clay	4	60
Gravel	10	70
Clay	3	73
Gravel and fine sand	17	90
Clay	1	91
Gravel and cobbles	6	97
Clay	1	98
Gravel	4	102
Pierre shale:		
Shale	1	103

B3-60-33dd

[Driller's log of irrigation well drilled by Mr. Holden, 1936. Surface altitude, 4,588.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	47	47
Gravel	6	53
Sand with some cementation	8	61
Sand, fine	13	74
Sand, coarse	13	87
Clay	2	89
Gravel, cemented	8	97

B3-60-36dc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,598.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand and gravel	11	17
Clay	5	22
Sand	12	34
Clay	6	40
Sand, fine, and silt	16	56
Clay and sand	9	65
Sand	5	70
Gravel, fine	10	80
Sand, fine	8	88
Gravel, fine	10	98
Clay	2	100
Gravel, fine, and strips of clay	25	125
Clay and sand	21	146
Gravel and pebbles	14	160
Cobbles	1	161

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B3-60-36dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel and rock	11	172
Pierre shale:		
Shale	1	173

B4-55-1da

[Driller's log of domestic well]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Sand, very fine to fine	40	54
Gravel	33	87

B4-55-6cb

[Driller's log of test hole drilled by Canfield Drilling Co., 1936. Surface altitude, 4,197.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Sand, coarse	6	20
Sand, fine	20	40
Sand, coarse	28	68
Clay	4	72
Gravel	24	96
Pierre shale:		
Shale	1	97

B4-55-9bc

[Driller's log of test hole drilled by Adams Well Works. Surface altitude, 4,171 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, hard	2	2
Soil, sandy	5	7
Clay	1	8
Sand, silty	2	10
Clay	5	15
Gravel	4	19
Sand, fine	5	24
Gravel, fine to medium	36	60
Sand, fine	3	63
Gravel, coarse	4	67
Pierre shale:		
Shale, clayey	6	73
Shale	1	74

B4-55-10bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,166 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	14	16
Sand	2	18
Sand and silt	12	30
Sand	4	34
Sand and silt	4	38
Sand	12	50
Clay	1	51

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B4-55-10bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand	5	56
Sand and silt	2	58
Sand	5	63
Gravel, coarse	25	88
Pierre shale:		
Shale, yellow	2	90
Shale, blue	2	92

B4-55-15cc

[Driller's log of test hole drilled by Adams Well Works]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, black	6	6
Sand and silt	9	15
Sand, fine	20	35
Sand, fine, and clay	27	62
Sand, coarse	6	68
Gravel, fine	10	78
Gravel, coarse	2	80
Pierre shale:		
Shale, blue	1	81

B4-55-16cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4, 187 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and silty sand	20	20
Sand	25	45
Sand, fine, and silt	5	50
Silt, blue	2	52
Sand, clean	13	65
Clay and sand	5	70
Sand	5	75
Gravel	10	85
Pierre shale:		
Shale	3	88

B4-55-18ac

[Driller's log of test hole drilled by Canfield Drilling Co., 1936. Surface altitude, 4,187.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand	10	20
Sand, coarse	30	50
Sand, fine	5	55
Gravel	10	65
Cobbles	1	66
Gravel	56	122

B4-55-20bc

[Driller's log of irrigation well drilled by Mr. Woberman, 1930. Surface altitude, 4, 195 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and silty sand	17	17

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-55-20bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium	58	75
Gravel, coarse	10	85

B4-55-20cc

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand, fine	6	10
Clay	5	15
Sand, fine	14	29
Sand, medium to coarse	6	35
Clay	2	37
Sand and silt	4	41
Clay	1	42
Sand and silt	12	54
Gravel	9	63
Pierre shale:		
Shale	5	68

B4-55-21ba

[Driller's log of test hole drilled by Canfield Drilling Co., 1945. Surface altitude, 4,186.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	12	14
Sand, medium and coarse	6	20
Sand, fine	12	32
Clay and sand	6	38
Sand, coarse	5	43
Sand, fine	13	56
Gravel, fine	2	58
Sand, fine	4	62
Gravel, fine	8	70
Gravel, coarse	10	80
Pierre shale:		
Shale	3	83

B4-56-5c

[Driller's log of stock well drilled by Mr. Weimer, 1918]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Loam, sandy	13	18
Sand, fine	8	26
Gravel	42	68
Clay	1	69
Gravel	41	110

B4-56-11cb

[Driller's log of test hole drilled by Mr. Woberman, 1934. Surface altitude, 4,205.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	40	40
Gravel	40	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B4-56-14bb

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,214 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt and fine sand, light-tan	11	11
Gravel, coarse, and sand, tan to gray	63	74
Gravel, medium to coarse; contains cobbles, brown	60	134
Sand and coarse gravel, tan to brown	29	163
Sand, coarse to fine, and silt, tan	18	181
Pierre shale:		
Shale, green to gray	7	188
Shale, laminar, blue to gray	2	190

B4-56-18bb

[Sample log of test hole 19 feet east and 502 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,287 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	7	11
Gravel, sand, and clay	6	17
Clay	1	18
Gravel and sand	3	21
Gravel, sand, and clay	17	38
Clay	17	55
Gravel, pebbles, and cobbles	3	58
Pierre shale:		
Shale, yellow	11	69
Shale, blue	6	75

B4-56-23bc

[Driller's log of test hole drilled by Oliver Well Works, 1930. Surface altitude, 4,206.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	17	17
Sand and gravel	72	89
Pierre shale:		
Shale	1	90

B4-56-26aa

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,206 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, silty, and fine sand, buff to brown	6	6
Sand, fine to medium, light-gray	62	68
Clay, sandy, brown	1	69
Gravel; contains coarse to fine sand and cobbles; pink to tan	27	96
Pierre shale:		
Shale, laminar, bluish-black	4	100

B4-56-30bb

[Sample log of test hole 18 feet east and 85 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,225 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-56-30bb—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay and sand	6	10
Gravel and sand	20	30
Gravel and cobbles	21	51
Pierre shale:		
Shale, blue	9	60

B4-56-30cb

[Sample log of test hole 13 feet east and 671 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,223 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Gravel and sand	52	54
Gravel and pebbles	22	76
Pierre shale:		
Shale, yellow	2	78
Shale, blue	12	90

B4-56-31bb

[Sample log of test hole 41 feet east and 18 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,234 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel and sand	45	51
Gravel, pebbles, and cobbles	32	83
Clay, yellow	12	95
Gravel, pebbles, and cobbles, red	21	116
Gravel, pebbles, cobbles, and clay	5	121
Gravel, pebbles, and cobbles, red	13	134
Pierre shale:		
Shale	5	139

B4-56-31bc

[Sample log of test hole 20 feet east and 76 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,245 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	7	11
Gravel and sand	53	64
Gravel, pebbles, and cobbles; red	147	211
Pierre shale:		
Shale, yellow	3	214
Shale, blue	6	220

B4-56-31cc

[Sample log of test hole 42 feet east and 53 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,263 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	5	9
Clay	8	17
Sand	9	26

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-56-31cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel and sand	51	77
Gravel, sand, and clay	4	81
Gravel, pebbles, and cobbles, red	57	138
Gravel, pebbles, cobbles, and clay	5	143
Gravel, pebbles, and cobbles, red	21	164
Pierre shale:		
Shale, yellow	1	165
Shale, blue	5	170

B4-56-34d

[Driller's log of test hole drilled by Mr. Burrows, 1936]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand, fine to medium	10	18
Sand, fine	20	38
Sand, coarse	32	70
Clay	1	71
Gravel	9	80

B4-57-1aa

[Sample log of test hole 16 feet west and 140 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,420 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	4	4
Sand and clay	7	11
Gravel, sand, and clay	12	23
Clay	3	26
Gravel, rocks, and clay	5	31
Clay	5	36
Gravel, pebbles, and cobbles	5	41
Gravel, pebbles, and cobbles; contains some clay	32	73
Pierre shale:		
Sandstone	1	74
Shale, yellow	5	79
Shale, black	11	90

B4-57-3dc

[Driller's log of test hole drilled in 1934]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	35	38
Sand, coarse	10	48
Gravel and cobbles	54	102

B4-57-5bb

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	15	20
Sand	2	22

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B4-57-5bb—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale, fragmental	22	44
Shale, blue	23	67
Concretion	1	68

B4-57-6cd

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay and sand	17	22
Clay	19	41
Sand and clay	4	45
Clay	2	47
Pierre shale:		
Shale	13	60

B4-57-11da

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand and clay	5	11
Clay, soft	27	38
Gravel, fine sand, and clay	6	44
Gravel and fine sand	6	50
Clay	5	55
Clay and fine sand	6	61
Clay	3	64
Pierre shale:		
Concretion	2	66
Clay	3	69
Shale	11	80

B4-57-12ad

[Driller's log of stock well drilled in 1930. Surface altitude, 4,344 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	16	20
Clay	10	30
Pierre shale:		
Shale	210	240

B4-57-24db

[Driller's log of irrigation well drilled by Adams Well Works, 1946. Surface altitude, 4,254.1 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Silt and very fine sand	4	8
Sand, fine	9	17
Sand, very fine to fine	14	31
Gravel and silt	3	34
Sand, fine	4	38

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-57-24db—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	3	41
Gravel, coarse, and cobbles	17	58

B4-57-27ac

[Driller's log of test hole. Surface altitude, 4,264 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand, coarse	22	26
Gravel	20	46
Clay, blue	1	47
Sand and gravel	31	78
Gravel, fine to medium	7	85

B4-57-29dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1941. Surface altitude, 4,285 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand	6	12
Clay	3	15
Sand and clay	5	20
Clay	4	24
Clay, sandy	10	34
Gravel	12	46
Clay and gravel	6	52
Clay	28	80

B4-57-30dd

[Driller's log of test hole drilled by Canfield Drilling Co., 1947]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	3	8
Sand	9	17
Gravel, sand, and cobbles	29	46
Pierre shale:		
Shale	4	50

B4-57-31bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,272.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	6	10
Gravel	8	18
Clay	17	35
Sand	7	42
Gravel and sand	9	51
Gravel	29	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-57-33b

[Driller's log of stock well drilled by Mr. Callon, 1932]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay	32	35
Gravel	3	38
Gravel and clay	12	50
Gravel and boulders	16	66
Pierre shale:		
Shale	1	67

B4-57-36ad

[Sample log of test hole 75 feet west and 284 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,243 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	7	11
Gravel and sand	53	64
Gravel and cobbles	28	92
Clay	4	96
Gravel, pebbles, and cobbles	78	174
Pierre shale:		
Shale	6	180

B4-58-1c

[Driller's log of test hole drilled in 1935]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	7	10
Gravel	5	15
Clay, yellow	10	25
Gravel	15	40
Clay, blue	10	50
Sand, coarse	10	60
Pierre shale:		
Shale	1	61

B4-58-5cd

[Sample log of test hole 1,183 feet west and 28 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,472 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	4	4
Sand	5	9
Sand and some clay	5	14
Clay and sand	4	18
Clay	2	20
Pierre shale:		
Shale, silty, and gypsum	38	58
Shale, blue	2	60

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-58-7ad

[Sample log of test hole 23 feet west and 78 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,439 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	2	6
Clay, sand, and gravel	8	14
Pierre shale:		
Silt, shale, and gypsum	41	55
Shale, blue	5	60

B4-58-7da

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,433 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy, and silt	3.5	3.5
Silt, calcareous	6.5	10
Silt, sandy	5	15
Sand and gravel	4	19
Pierre shale(?):		
Clay, weathered	3	22
Clay, hard, buff	23	45
Silt, olive-gray	25	70

B4-58-11c

[Driller's log of test hole drilled in 1930]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	52	56
Pierre shale:		
Shale	16	72

B4-58-18ba1

[Driller's log of test hole drilled for U. S. Bureau of Reclamation. Surface altitude, 4,326 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, brown	3	3
Clay, brown to dark-brown	4	7
Clay, silty, yellow-brown	3	10
Pierre shale:		
Siltstone, weathered, yellow to brown	5	15
Siltstone, green to gray	44	59

B4-58-18ba2

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,311 feet]

Pleistocene and Recent deposits, undifferentiated:		
Gravel and sand	9	9
Pierre shale:		
Siltstone, weathered, green to gray	2	11
Siltstone, thin-bedded, green	23	34

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-58-18ba2—Continued

	Thickness (feet)	Depth (feet)
Pierre shale—Continued		
Clay, massive, dark-green	3	37
Siltstone, friable, and fine gravel; firm, green to gray	23	60

B4-58-18bc

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,345 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, clayey	2.5	2.5
Loam, sandy	2.5	5
Sand, coarse	12.5	17.5
Pierre shale:		
Siltstone, weathered, soft, yellow to brown	2.5	20
Siltstone, massive, dark-gray	50	70

B4-58-18bd1

[Driller's log of test hole 500 feet east and 50 feet south of northwest corner of quarter-quarter section, drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,316 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and gravel	5	5
Loam, sandy, and clay	2.5	7.5
Gravel and sand	3	10.5
Pierre shale:		
Siltstone, weathered	1	11.5
Siltstone, massive, argillaceous, dark-gray	51.5	63

B4-58-18bd2

[Driller's log of test hole 40 feet east and 400 feet south of northwest corner of quarter-quarter section, drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,344 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	2	2
Gravel, sandy	3	5
Gravel and sand	5	10
Sand, coarse	5.9	15.9
Pierre shale:		
Shale, weathered, brown	1.1	17
Siltstone, massive, dark	1	18
Siltstone, calcareous, hard	2	20
Siltstone, massive, hard and soft layers, gray to green	5	25
Siltstone, clayey, dark-green	42	67

B4-58-18cb

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,395 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, yellow to brown	2	2
Loam, sandy	14	16
Loam, sandy, and coarse sand	4	20
Sand, medium to fine, and silt	5	25
Sand, silt, and clay, light-yellow to brown	10	35
Sand and silt, light-gray to black	5	40
Sand, coarse, brown to gray	15	55

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B4-58-18cb— Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated— Continued		
Sand, silty to coarse, brown	21	76
Pierre shale:		
Shale, weathered	2	78
Shale, clayey, dark-green to gray	52	130

B4-58-21d

[Driller's log of test hole drilled by Mr. Dodge, 1936]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	18	22
Sand	3	25
Clay, soft	35	60
Sand	6	66
Clay	1	67
Sand	2	69
Clay	1	70
Sand	10	80
Clay	2	82
Sand	8	90
Gravel	22	112

B4-58-25ca

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Sand	12	12
Clay	4	16
Sand	2	18
Clay	5	23
Pierre shale:		
Shale, fragmental	7	30
Shale	5	35

B4-58-26cb

[Driller's log of test hole 200 feet east and 200 feet north of southwest corner of quarter-quarter section, drilled for U. S. Bureau of Reclamation, 1948. Surface altitude, 4, 287 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine	7	7
Sand, silty	2	9
Sand, coarse, and fine gravel	5	14
Pierre shale:		
Shale	22	36

B4-58-28dd

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4, 318 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine	16	16
Sand, coarse	34	50

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B4-58-29cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1947. Surface altitude, 4,399 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	18	22
Sand, silty; contains interbedded clay	39	61
Gravel and fine sand	22	83
Gravel and sand	37	120
Gravel, red	38	158
Pierre shale:		
Shale	2	160

B4-58-30dc

[Driller's log of test hole drilled by Canfield Drilling Co., 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand, fine, and silt	9	13
Sand, medium to coarse, and silt	9	22
Sand, fine to coarse	7	29
Sand, fine, and silt	12	41
Gravel and silt	5	46
Clay	5	51
Sand and clay	5	56
Gravel	14	70
Sand and clay	14	84
Sand, coarse, and silt	5	89
Gravel and sand	6	95
Carbonaceous wood	1	96
Gravel and sand	8	104
Gravel	26	130
Gravel and rocks	26	156
Pierre shale:		
Shale	1	157

B4-58-31cc

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1947. Surface altitude, 4,417.7 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	27	31
Sand, fine	33	64
Gravel, fine, and sand	17	81
Clay and fine sand	23	104
Clay	21	125
Clay and sand	17	142
Gravel and clay	9	151
Gravel	55	206
Gravel and fragments of shale	6	212
Gravel	7	219
Pierre shale:		
Shale	1	220

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-58-34da

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1948. Surface altitude, 4,359 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	12	12
Sand, fine	38	50
Sand, coarse	70	120
Clay, soft, yellow	10	130

B4-58-35bb

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1948. Surface altitude, 4,328 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy	10	10
Sand, fine	20	30
Sand, coarse, and cobbles	5	35
Sand, coarse	6	41
Clay, yellow	4	45
Pierre shale:		
Shale	10	55

B4-59-6cd

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4,440 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine	9	9
Clay, yellow; contains some sand	5	14
Sand, fine	56	70
Sand, coarse	7	77

B4-59-13dc

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1948. Surface altitude, 4,407 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	7	7
Sand and clay	19	26
Sand, coarse	5	31
Clay	5	36
Sand, coarse	13	49
Sand, fine to medium	38	87
Gravel	30	117
Pierre shale:		
Shale	3	120

B4-59-23a

[Driller's log of domestic well drilled in 1909]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Gravel and clay	4	7
Sand	33	40
Clay	1	41
Sand	19	60

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-59-23a—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	2	62
Gravel	24	86
Clay, blue	4	90
Gravel	17	107

B4-59-24aa

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,398 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium, and silt, brown to gray	4	4
Loam, sandy	2	6
Sand, medium, silty, yellow to brown	4	10
Loam, sandy, yellow to brown	7	17
Sand, medium to coarse	3	20
Sand and clay	1	21
Sand, very fine to coarse, and silt; contains calcium carbonate	39	60
Sand and gravel	10	70
Sand, coarse, light- to dark-yellow	18	88
Sand and gravel	23	111
Pierre shale:		
Shale, very soft	2	113
Shale, clayey, green to gray	39	152
Shale, sandy	10	162

B4-59-24cc

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1943. Surface altitude, 4,435 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, dark-brown	15	15
Sand, medium to coarse, silty, brown to gray	40	55
Sand, coarse, and silt, dark-yellow to brown	20	75
Sand, fine to coarse, silty	10	85
Sand, silty, and gravel	11	96
Sand, very fine to fine, and silt, yellow to brown	15	111
Sand, medium to coarse, and silt, brown	23	134
Sand, medium, and silt, brown	6	140
Gravel and coarse sand, brown to gray	27	167
Sand, fine	2	169
Sand, gravel, and weathered shale	6	175
Pierre shale:		
Shale, weathered, buff	2	177
Shale, sandy, dark-gray	29	206

B4-59-29ac

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Sand and silt	30	40
Sand	20	60
Clay and sand	18	78
Sand, medium and coarse	12	90
Gravel, clean	11	101
Clay	4	105
Sand	3	108

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO. — Continued

B4-59-29ac—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	12	120
Sand, fine	16	136
Gravel	14	150
Clay	4	154
Silt	12	166
Gravel, red	84	250
Cobbles	6	256

B4-59-31bc

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,502.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Sand	55	70
Sand, coarse	15	85
Gravel	18	103
Sand, fine	42	145
Clay and sand	38	183
Clay, sand, and pebbles	27	210
Gravel	4	214
Pierre shale:		
Shale	6	220

B4-59-34dc

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1944. Surface altitude, 4,418 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, yellow to brown	5	5
Sand, medium to coarse, and clay	10	15
Sand, medium to coarse, brown	30	45
Clay and sand; contains some silt	30	75
Sand, coarse to medium, gray	24	99
Clay, dark-brown	3	102
Sand, light-brown	14	116
Sand and coarse gravel; brown	8	124
Sand, medium	4	128
Gravel and coarse sand, brown	17	145
Sand, silty	5	150
Sand and coarse gravel	11	161
Sand, fine	2	163
Pierre shale:		
Shale, weathered, brown	2	165
Shale, massive, green to gray	48	213

B4-59-35ac

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,439.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	33	38
Clay	2	40
Sand	38	78
Clay	22	100
Sand	45	145
Gravel, coarse	63	208

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B4-59-35ac—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sandstone	2	210
Gravel, coarse	8	218
Pierre shale:		
Shale	2	220

B4-60-2da

[Sample log of test hole 948 feet west and 600 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,391 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand	5	11
Clay	2	13
Gravel, coarse, red	42	55
Clay	8	63
Gravel	18	81
Clay and fine sand	10	91
Clay and silt	32	123
Pierre shale:		
Shale, blue	7	130

B4-60-7bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1945]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand	34	37
Gravel	62	99
Clay	14	113
Gravel	1	114
Pierre shale:		
Shale	2	116

B4-60-11ad

[Sample log of test hole 22 feet west and 97 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,459 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Sand and clay	17	23
Sand, fine, and silt	34	57
Gravel, fine, and sand	5	62
Sand, very fine to fine	4	66
Gravel and sand	10	76
Clay and quicksand	13	89
Sand, silt, and clay	17	106
Gravel, fine, and silty sand	6	112
Gravel, pebbles, and cobbles	24	136
Pierre shale:		
Shale, yellow	1	137
Shale, blue	3	140

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-60-12bc

[Driller's log of test hole drilled by Canfield Drilling Co., 1948. Surface altitude, 4,462.0 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay	8	16
Sand and clay	6	22
Sand, fine	19	41
Sand, coarse	18	59
Sand, fine to medium	5	64
Gravel, fine	14	78
Clay	4	82
Sand and clay	18	100
Gravel	10	110
Sand and clay	8	118
Gravel, red	20	138
Pierre shale:		
Shale	2	140

B4-60-12cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1942. Surface altitude, 4,466.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	14	18
Clay	13	31
Sand	13	44
Sand, silty	4	48
Gravel, fine	6	54
Sand and clay; contains some silt	4	58
Gravel	14	72
Clay	15	87
Gravel, fine, and silt	6	93
Gravel, clean, coarse	1	94
Clay and sand	13	107
Gravel, silty	5	112
Clay, blue	3	115
Gravel, silty	13	128
Gravel, pebbles, and cobbles, red	38	166
Pierre shale:		
Shale	11	177

B4-60-13cb

[Sample log of test hole 74 feet east and 9 feet south of northwest corner of quarter-quarter section, drilled for U.S. Geological Survey, 1947. Surface altitude, 4,476 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	7	11
Clay	8	19
Sand, fine	23	42
Clay and fine sand	4	46
Sand, fine	9	55
Gravel and sand	22	77
Sand and clay	14	91
Sand and silt; contains some gravel	6	97
Clay, gravel, and sand; contains some silt	6	103
Sand, very fine to fine, and clay	20	123
Sand	8	131

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska — Continued

MORGAN COUNTY, COLO. — Continued

B4-60-13cb—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	9	140
Gravel, pebbles, and cobbles, red	21	161
Pierre shale:		
Shale, yellow	1	162
Shale, blue	8	170

B4-60-14cb

[Driller's log of test hole drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy	10	10
Sand	10	20
Clay and sand streaks	30	50
Sand, coarse	5	55
Sand, fine	5	60
Clay and sand	4	64
Sand, fine	14	78
Clay and sand	27	105
Sand, fine	5	110
Clay and sand	2	112
Sand, silty	18	130
Gravel, yellow iron stains	5	135
Gravel	31	166
Pierre shale:		
Shale	4	170

B4-60-15ac

[Driller's log of test hole drilled by Canfield Drilling Co., 1948]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and silt	4	4
Sand	15	19
Sand and clay	27	46
Sand and gravel	15	61
Gravel	8	69
Clay	5	74
Sand, fine, and gravel	10	84
Gravel, sandy	14	98
Clay	1	99
Gravel and sand	37	136
Gravel and cobbles	21	157
Pierre shale:		
Shale, black	10	167
Shale, interbedded with sandstone	905	1,072

B4-60-24bb

[Driller's log of test hole drilled by Canfield Drilling Co., 1942. Surface altitude, 4,479.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and sand	20	20
Clay and sand	35	55
Sand, fine	20	75
Gravel and silt	5	80
Gravel	14	94
Clay, blue, and fine sand	46	140
Gravel, coarse; contains pebbles and cobbles	23	163
Pierre shale:		
Shale	7	170

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B4-60-24cc

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1937. Surface altitude, 4,488.6 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and clay	75	75
Sand and gravel	150	225

B4-60-25dc2

[Driller's log of irrigation well drilled by Canfield Drilling Co. Surface altitude, 4,499.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand and silt	17	20
Sand, coarse	30	50
Sand, coarse and very coarse	8	58
Sand and silt	17	75
Gravel, fine	30	105
Sand, fine, and silt	17	122
Sand	33	155
Gravel, fine; contains pebbles and cobbles	5	160
Sand	14	174
Clay and sand	6	180
Gravel and cobbles	20	200
Gravel	10	210
Sand, fine	5	215
Gravel	2	217
Sand, slightly cemented	21	238
Sand, fine	2	240

B4-60-26bd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946. Surface altitude, 4,498 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand	7	12
Clay	2	14
Sand	3	17
Clay	3	20
Clay, sandy	5	25
Sand and clay	35	60
Gravel and silt	10	70
Clay	5	75
Sand and clay	9	84
Sand, stained yellow brown by iron	21	105
Sand	20	125
Clay	3	128
Gravel and silt	12	140
Clay	5	145
Clay, sandy	19	164
Gravel	6	170
Clay, interbedded with gravel	10	180
Gravel, coarse; contains pebbles and cobbles	25	205
Sand	5	210
Gravel	4	214
Clay and sand	12	226
Gravel	9	235
Gravel, pebbles, and cobbles	5	240

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B4-60-27cc

[Driller's log of test hole drilled by Canfield Drilling Co., 1940. Surface altitude, 4,508 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay, interbedded with sand	64	70
Gravel, coarse	11	81
Clay, interbedded with sand	21	102
Sand and gravel	18	120
Sand	13	133
Clay and sand	5	138
Pebbles and cobbles	15	153
Clay	3	156
Gravel	17	173
Clay	2	175
Gravel	43	218
Clay, blocky	5	223
Gravel, very coarse	10	233

B4-60-32ad

[Driller's log of test hole drilled by Canfield Drilling Co. Surface altitude, 4,506.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Gravel	5	10
Clay	9	19
Sand	13	32
Gravel, fine	23	55
Sand and clay	22	77
Clay	3	80
Sand	12	92
Gravel	88	180

B4-60-33dc

[Driller's log of test hole drilled by Mr. Harshman, 1945. Surface altitude, 4,528 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	1	1
Clay	3	4
Sand, interbedded with clay	46	50
Sand, fine to medium	13	63
Sand, fine to coarse	12	75
Clay; contains 25 percent sand	17	92
Sand, fine; contains 20 percent clay	16	108
Sand, fine to medium	7	115
Sand, fine to coarse	42	157
Pierre shale:		
Shale	1	158

B4-60-35ad

[Sample log of test hole 19 feet west and 3 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,502 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand and clay	10	14
Clay	4	18
Sand	13	31
Clay	7	38

Logs of test holes, wells and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B4-60-35ad—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand and clay	13	51
Gravel, sand, and clay	13	64
Gravel and sand	38	102
Sand, fine	10	112
Clay and very fine sand	14	126
Gravel and sand	12	138
Gravel, coarse, pebbles, and cobbles, red	31	169
Pierre shale:		
Shale, yellow	5	174
Shale, blue	6	180

B5-55-27dc

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1936. Surface altitude, 4,134.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand, fine	3	8
Sand, coarse	42	50
Gravel	28	78

B5-55-28aa

[Sample log of test hole 1,056 feet west and 12 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,172 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine to fine, and silt, tan to brown	10	10
Sand, fine, and silt, light-tan	22	32
Silt, brown	14	46
Clay, tan to gray	4	50
Gravel, medium to fine, and coarse sand	2	52
Sand, medium to fine, and fine gravel, tan to buff	6	58
Pierre shale:		
Shale, laminar, blue	2	60

B5-55-28ca

[Driller's log of test hole drilled by Canfield Drilling Co., 1937. Surface altitude, 4,163.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy	4	4
Clay and sand	14	18
Sand, fine	17	35
Clay	1	36
Gravel and fine sand	14	50
Gravel	5	55
Clay	5	60
Pierre shale:		
Shale, yellow	10	70

B5-55-34ab

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,136 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to very fine, tan	5	5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B5-55-34ab—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, coarse to fine, sandy, tan to gray	73	78
Cobbles; contains coarse and medium gravel and sand	36	114
Pierre shale:		
Shale, weathered, sandy, brown	2	116
Shale, brittle, blue	4	120

B5-55-35cd

[Driller's log of irrigation well drilled by Mr. Woberman, 1937. Surface altitude, 4,147.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil and silt	21	21
Sand, fine, and gravel	40	61
Sand and gravel	27	88

B5-55-36bb

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1939]

Pleistocene and Recent deposits, undifferentiated:		
Soil	20	20
Sand, very fine to fine	14	34
Gravel	56	90

B5-56-28dd

[Driller's log of domestic well drilled by Mr. Williams, 1911]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay	20	25
Gravel	35	60
Pierre shale:		
Shale	556	616

B5-56-34cc

[Sample log of test hole 1, 100 feet east and 18 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,260 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, and silt, light-brown	8	8
Gravel, coarse to fine, and coarse and medium sand	18	26
Pierre shale:		
Shale, sandy, laminar, buff to tan	3	29
Shale, sandy, calcareous, concretionary	26	55

B5-57-21c

[Driller's log of stock well drilled in 1917]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Clay, yellow	21	24
Clay, blue	17	41
Sand	1	42
Clay, blue	48	90

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B5-57-21c—Continued

	Thickness (feet)	Depth (feet)
Pierre shale:		
Shale	50	140

B5-57-30bd

[Driller's log of test hole drilled by Canfield Drilling Co., 1940]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Clay, yellow	12	20
Sand and clay	3	23
Clay	21	44
Sand and gravel; contains clay balls and strips of clay	19	63
Pierre shale:		
Shale	17	80

B5-57-30cd

[Driller's log of test hole drilled by Canfield Drilling Co., 1946]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Sand and clay	6	11
Clay	5	16
Clay, sandy, hard	8	24
Pierre shale:		
Shale, fragmental	28	52
Shale, blue	8	60

B5-57-33da

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay, sandy	12	16
Sand, fine	2	18
Gravel	5	23
Limestone	3	26
Sand and clay	18	44
Sand and gravel	6	50
Clay, sandy	5	55
Clay	10	65
Sand	5	70
Magnesia	3	73
Sand, fine	3	76
Sand, coarse	4	80
Sand; contains pebbles and cobbles	5	85
Pierre shale:		
Shale, fragmental	5	90
Shale	1	91

B5-58-21ca

[Driller's log of test hole drilled by Canfield Drilling Co., 1946]

Pleistocene and Recent deposits, undifferentiated:		
Sand	3	3
Clay	3	6
Clay, hard	4	10

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. —Continued

B5-58-21ca—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Rock	1	11
Clay	15	26
Pierre shale:		
Shale	21	47

B5-59-20ba

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4,460 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Pierre shale:		
Shale, brown	13	15

B5-59-29ba

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4,416 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	1	1
Clay, sandy	17	18
Sand, coarse	2	20
Clay, yellow	12	32
Pierre shale:		
Shale, blue	12	44

B5-59-30dd

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4,369 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	1	1
Silt and fine sand	4	5
Clay, sandy	5	10
Sand, coarse	4	14
Pierre shale:		
Shale	12	26

B5-59-31db

[Driller's log of test hole drilled for U. S. Bureau of Reclamation, 1947. Surface altitude, 4,363 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, coarse	16	16
Pierre shale:		
Shale	10	26

B5-60-14aa

[Sample log of test hole 77 feet west and 14 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,463 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	3	7

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

MORGAN COUNTY, COLO. — Continued

B5-60-14aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay and sand	9	16
Sand and silt	4	20
Sand and clay	6	26
Pierre shale:		
Shale, gray	4	30
Shale, blue to gray	19	49
Shale, blue	6	55

B5-60-23da

[Sample log of test hole 13 feet west and 337 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,420 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay and sand	3	5
Clay	4	9
Gravel, fine, and sand	12	21
Sand, fine, and silt	14	35
Clay	7	42
Clay and some sand	11	53
Pierre shale:		
Shale, fragmental	12	65
Shale, blue	15	80

B5-60-26ad

[Sample log of test hole 71 feet west and 19 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,384 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	3	7
Gravel and sand	18	25
Clay and sand	4	29
Clay	17	46
Clay and sand	14	60
Clay, interbedded with sand	6	66
Clay	6	72
Clay, gravel, and sand	9	81
Clay	6	87
Pierre shale:		
Shale, blue	13	100

B5-60-33ab

[Driller's log of test hole drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	5	9
Clay and very fine sand	20	29
Sand, coarse	2	31
Sand, fine, and silt	4	35
Sand, fine	3	38
Clay	2	40
Pierre shale:		
Shale	6	46

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

MORGAN COUNTY, COLO.—Continued

B5-60-35ad

[Sample log of test hole 24 feet west and 414 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,375 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Gravel and sand	17	19
Clay, yellow	37	56
Clay, blue	7	63
Sand and clay	7	70
Sand and gravel, interbedded with clay	15	85
Pierre shale:		
Shale, blue	15	100

SEDGWICK COUNTY, COLO.

B11-45-5aa

[Sample log of test hole 250 feet east and 16 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,539 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, black; contains fine silt and clay	4.2	4.2
Silt; contains gravel and clay; black	1.3	5.5
Sand, medium to coarse, tan	5.5	11
Gravel, medium to coarse, pink to tan	2	13
Gravel, medium, and coarse sand, pink to tan	6	19
Clay, silty, tan; contains pink to tan gravel	2.8	21.8
Gravel, medium to coarse, pink to tan	11.2	33
Sand, coarse, and medium gravel, light-brown	6	39
Gravel, medium to coarse, pink to tan; interbedded with clay	3	42
Gravel, fine to medium, pink to tan	5.8	47.8
Gravel, medium to coarse, tan to brown	6.2	54
Gravel, medium to coarse, cemented, tan	3.4	57.4
Clay, yellow to brown; contains light-brown fine sand and silt	3.6	61
Gravel, fine, and coarse sand, pink to tan	2	63
Gravel, medium to coarse, pink to tan; contains tan clay	10	73
Sand, very fine, and silt, interbedded with clay	19	92
Gravel, fine to medium, and fine to coarse sand; pink to tan	1	93
Sand, very fine to fine, and silt, light-brown	6	99
Gravel, medium, pink to tan	4	103
Gravel, medium to coarse	10	113
Gravel, fine to medium, pink to tan	10	123
Gravel, fine to medium, and coarse sand, brown	3	126
Gravel, medium, pink to tan	22.5	148.5
Brule formation:		
Clay, silty, light-tan	5.5	154

B11-45-5db

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 3,526 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, interbedded with gravel, tan	4.5	4.5
Clay, light-gray, interbedded with pink to tan sand and gravel	4.5	9
Clay, blue to black	7	16
Sand, medium to coarse, tan to brown	4.6	20.6
Gravel, medium to coarse, pink to tan	30.4	51
Brule formation:		
Clay and siltstone, tan to light-brown	16	67

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

SEDGWICK COUNTY, COLO.—Continued

B11-46-8aa

[Sample log of test hole 123 feet west and 32 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,521 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, black to tan; contains some pink to tan medium gravel	2.8	2.8
Gravel, very coarse to medium, pink to tan	10.2	13
Gravel, medium to coarse, pink to tan	10	23
Gravel, medium, pink to tan	4.8	27.8
Gravel, cemented with silica	25.2	53
Gravel, medium to coarse, brown to pink to tan	11	64
Gravel, medium to coarse, cemented with calcium carbonate, brown to pink to tan	19.5	83.5
Brule formation:		
Clay and silt; tan to light-brown	6.5	90

B11-45-8dd

[Sample of test hole 32 feet east and 780 feet north of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,550 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, black; contains fine to medium gravel	6	6
Gravel, medium to coarse, pink to tan	7	13
Gravel, coarse, pink to tan	1	14
Gravel, medium to coarse, pink to tan	19	33
Clay, light-brown to black; contains silt	8.6	41.6
Gravel, fine to medium, pink to tan	2.3	43.9
Brule formation:		
Clay and siltstone, light-tan	9.1	53

B11-45-17dc

[Sample log of test hole 20 feet west and 256 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,677 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sand, and gravel, black to tan	5.5	5.5
Sand and gravel, tan to light-brown	11.5	17
Silt and fine sand, gray	6	23
Gravel, fine to medium, pink to tan	12	35
Gravel, medium, pink to tan	8	43
Gravel, fine to medium, pink to tan	10	53
Gravel, medium, interbedded with tan sand and clay	7	60
Clay and silt, light-tan to gray	7.5	67.5
Gravel, fine to coarse	9	76.5
Clay and silt, light-gray to brown	8	84.5
Gravel, fine to medium, pink to tan	17.5	102
Silt; contains very fine sand, pink to tan	17	119
Gravel, fine to medium, pink to tan	4	123
Gravel, fine to medium, pink to tan, with calcareous cement	6.2	129.2
Brule formation:		
Silt; contains very fine sand and clay, light-gray to tan	23.8	153

B11-46-8bb

[Sample log of test hole 85 feet east and 5 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,606 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, and silt, light-brown to tan	9.9	9.9
Sand, fine, and silt, tan; contains very fine pink to tan gravel	1.3	11.2
Gravel, medium; contains fine to coarse sand	7.7	18.9

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

SEDGWICK COUNTY, COLO.—Continued

B11-46-8bb—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, medium to coarse; contains sharp chips broken from cobbles; pink to tan	2.1	21
Gravel, fine; contains medium and coarse sand; pink to tan	2	23
Gravel, fine to medium, pink to tan	4	27
Sand, fine to coarse; contains medium gravel; pink to tan	4	31
Sand, medium to coarse, and fine to coarse gravel, pink to tan	2	33
Gravel, medium to coarse; contains chips of quartz broken from cobbles; pink to tan	1.5	34.5
Brule formation:		
Siltstone and clay, medium-tan	8.5	43

B11-46-8bc

[Sample log of test hole 75 feet east of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,592 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay; contains fine sand and silt; light-brown	11.2	11.2
Gravel, medium to coarse, pink to tan	2.8	14
Sand, medium and coarse; contains fine gravel; brown to pink to tan	2.5	16.5
Sand, medium; contains trace of fine gravel; brown to pink to tan	2	18.5
Gravel, fine to medium; contains coarse sand; pink to tan	4.5	23
Gravel, medium to coarse, pink to tan	7.8	30.8
Gravel, medium, pink to tan	14.2	45
Brule formation:		
Siltstone, light-tan	3	48

B11-46-8cc

[Sample log of test hole 117 feet east and 30 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,576 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and road fill	3.6	3.6
Clay, tough, plastic, light-gray	3.4	7
Clay, tough, green to greenish-blue	3	10
Clay, tough, plastic, interbedded with pink to tan gravel, black to dark-gray	3	13
Gravel, fine to medium, pink to tan	2.9	15.9
Gravel, medium to coarse, pink to tan	13.6	29.5
Gravel, fine to medium; contains coarse sand; pink to tan	1	30.5
Brule formation:		
Clay, silty, light-tan	12.5	43

B11-46-17bc

[Sample log of test hole 98 feet east of southwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,577 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, silty, black	7.5	7.5
Clay, silty, green	4	11.5
Clay; contains sand and gravel; green to tan	1.5	13
Gravel, fine to medium, pink to tan	2	15
Gravel, medium to coarse, pink to tan	1.5	16.5
Gravel, medium; contains coarse sand; pink to tan	6.5	23
Gravel, medium, pink to tan	20.4	43.4
Gravel, fine to coarse; contains 15 percent coarse sand; pink to tan	10	53.4
Gravel, medium to coarse, pink to tan	10	63.4
Gravel, fine to medium, pink to tan	12	75.4
Gravel, fine to medium; contains 30 percent coarse sand; pink to tan	8	83.4

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

SEDGWICK COUNTY, COLO.—Continued

B11-46-17bc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, medium to coarse, tan	3.5	86.9
Brule formation:		
Siltstone, clayey, medium to light-tan	2.5	89.4

B11-46-19aa

[Sample log of test hole 16 feet west and 67 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,582 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Road fill	8.9	8.9
Gravel, medium and coarse, pink to tan	4.1	13
Silt; contains medium to coarse sand; tan to brown	8	21
Gravel, fine to medium, pink to tan to light-gray	7	28
Gravel, medium to coarse, pink to tan	5	33
Gravel, medium; contains coarse sand; pink to tan	8.6	41.6
Gravel, medium to coarse, pink to tan	7.4	49
Clay, interbedded with silt and fine sand, tan to light-brown	7.5	56.5
Gravel, fine to medium, pink to tan, interbedded with tan clay	6.9	63.4
Sand, fine to medium; contains silt and clay; tan to light-brown	25.5	88.9
Gravel, fine to medium, pink to tan	4.5	93.4
Sand, medium, tan to light-brown; cemented with calcium carbonate	10	103.4
Sand, fine to medium. and silt; tan	4	107.4
Gravel, medium, pink to tan	11	118.4
Sand, medium to coarse; contains fine to medium gravel; cemented with calcium carbonate, pink to tan	5	123.4
Gravel, fine to medium, cemented with calcium carbonate	10	133.4
Gravel, fine to medium; contains medium to coarse sand; cemented with calcium carbonate, pink to brown	19.6	153
Gravel, fine to medium, pink to brown	8	161
Gravel, medium to coarse, pink to brown	6	167
Sand, medium to coarse, light-tan; contains calcareous nodules	4	171
Siltstone, pink to tan	2	173
Gravel, medium, pink to tan	2.5	175.5
Sand, coarse, and fine gravel; pink to tan to brown	4.3	179.8
Gravel, fine to medium, pink to brown	5.5	185.3
Gravel, medium to coarse, cemented with silica, pink to tan	29.7	215

B11-46-19ad

[Sample log of test hole 126 feet west and 12 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,583 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, silty, black; contains some gravel	4.5	4.5
Clay, gray, with iron stains	6	10.5
Gravel, medium to coarse, pink to tan	6.7	17.2
Brule formation:		
Siltstone; contains some clay; gray to tan	25.8	43
Siltstone, sandy, slightly clayey, gray to tan	40	83
Chadron formation(?):		
Clay, light-gray to light-green	10	93
Clay, light-gray to light-green; contains trace of tan siltstone	20	113
Clay, light-gray to white	23	136
Pierre shale:		
Clay, yellow to brown; contains concretions	17	153
Shale, hard, laminar, black	10	163

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

SEDGWICK COUNTY, COLO.—Continued

B11-46-19dd

[Sample log of test hole 35 feet west and 600 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,628 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt, black; contains fine to coarse sand and medium gravel	8.5	8.5
Gravel, medium to coarse	3.5	12
Brule formation:		
Siltstone, tan to light-brown	11	23

B11-47-4ac

[Driller's log of test hole drilled in 1936]

Pleistocene and Recent deposits, undifferentiated:		
Soil	17	17
Gravel	6	23
Clay	12	35
Gravel	10	45

B12-45-20ca

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,572 feet]

Alluvium:		
Soil and clay	9	9
Gravel, fine to coarse, containing coarse sand, tan	28	37
Brule formation:		
Clay, silty to fine sandy, blocky, tan to pinkish-buff	63	100

B12-45-20cb

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,587 feet]

Road fill	4	4
Alluvium:		
Clay, blocky, gray-green	7	11
Gravel, fine to coarse, contains coarse sand, tan	35	46
Brule formation:		
Clay, silty, blocky, tan	4	50

B12-45-20da1

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,568 feet]

Alluvium:		
Soil and clay, dark-gray to black	9	9
Gravel and fine to coarse sand	3	12
Gravel, coarse (large pebbles or cobbles indicated by clatter of drill stem)	23	35
Brule formation:		
Clay, fine sandy to silty, hard, blocky, tan	5	40
Clay, hard, brittle, blocky, pinkish-buff	30	70
Clay, soft, light grayish-tan	8	78
Clay, blocky, light-gray	42	120

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

SEDGWICK COUNTY, COLO. —Continued

B12-45-20da2

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,571 feet]

	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and sandy clay, dark-gray	6	6
Sand, fine to coarse	4	10
Gravel, fine to coarse, containing coarse sand (thin layer of clay at 23 feet)	15	25
Sand, fine to coarse, containing fine gravel	3	28
Gravel, fine to coarse, containing coarse sand	2	30
Brule formation:		
Clay, soft, plastic, light-tan	5	35
Clay, moderately hard, blocky, tan, alternating with tan plastic clay	15	50
Gravel, coarse; consists of large subangular to subrounded pebbles of hard blocky tan clay (porous zone)	9	59
Clay, hard, blocky, pinkish-buff	16	75
Clay, soft, plastic, light grayish-tan	8	83
Clay, blocky, moderately hard, light-gray to tan	162	245
Clay, soft, plastic, light-gray to white	7	252
Chert, hard, brittle, brown, white, pink, and green, containing hard brown fine-grained sandstone	7	259
Chert, hard, brittle, light-green to dark green	4	263
Clay, sandy, plastic, light-gray	30	293
Sand, fine to medium, light-gray, interbedded with thin layers of light-gray plastic sandy clay	7	300

B12-45-20db

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,571 feet]

Road fill	7	7
Alluvium:		
Gravel, fine to medium, and coarse sand, containing a little coarse gravel	11	18
Gravel, medium to coarse, containing fine gravel and a little coarse sand	9	27
Gravel, fine to medium, containing a little sand	3	30
Gravel, fine to coarse, containing sand	5	35
Gravel, fine to coarse	2	37
Brule formation:		
Clay, sandy, tan and buff; a few fragments water-worn	13	50
Clay, hard, brittle, pinkish-tan	50	100

B12-45-21ca

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,575 feet]

Alluvium:		
Soil and sand, fine to coarse, dark-gray	5	5
Gravel, fine to coarse, containing fine to coarse sand	11	16
Brule formation:		
Clay, silty to fine sandy, blocky, buff to light-tan	34	50
Clay, blocky, gray to tan	20	70
Clay, laminated, pinkish-buff	8	78
Clay, fine sandy, blocky, pinkish-buff	10	88
Clay, sandy, plastic, gray	12	100

B12-45-21cb1

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,570 feet]

Alluvium:		
Soil and sand, fine to medium, dark-gray	5	5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

SEDGWICK COUNTY, COLO. — Continued

B12-45-21cb1—Continued

	Thickness (feet)	Depth (feet)
Alluvium—Continued		
Gravel, fine to coarse, containing fine to coarse sand	5	10
Gravel, coarse, containing fine to medium gravel	14	24
Brule formation:		
Clay, silty to fine sandy, hard, blocky, light-tan to buff	2	26
Clay, silty to fine sandy, soft, plastic, light-gray to buff	4	30

B12-45-21cb2

[Sample log of test hole drilled for the Town of Julesburg, 1948. Surface altitude, 3,569 feet]

	Thickness (feet)	Depth (feet)
Alluvium:		
Soil and sand, fine to coarse, dark-gray	8	8
Gravel, coarse, containing fine to medium gravel and coarse sand	9	17
Brule formation:		
Clay, silty to fine sandy, blocky, light-tan	43	60

B12-45-28cc

[Sample log of test hole 91 feet east and 23 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,550 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, very tough, blocky, black	6.8	6.8
Gravel, medium to coarse, pink to tan	13.2	20
Gravel, medium to coarse, pink to tan and black	3	23
Gravel, fine to coarse, pink to tan and black	10	33
Gravel, fine to medium, pink to tan	5	38
Brule formation:		
Siltstone, pink	5	43
Siltstone and clay, tan to light-brown	10	53

B12-45-32ad

[Sample log of test hole 37 feet west of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 3,546 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, silty, black	6.5	6.5
Sand, very fine to coarse; contains clay and silt; light-brown	10.5	17
Gravel, medium to coarse, pink to tan	41	58
Brule formation:		
Clay, silty, light-tan	5	63

WASHINGTON COUNTY, COLO.

B1-54-7aa

[Sample log of test hole 50 feet west and 20 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,503 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	4	4
Clay	2	6
Pierre shale:		
Shale, hard, yellow	32	38
Shale, gray	4	42
Shale, blue	4	46

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WASHINGTON COUNTY, COLO.—Continued

B1-54-7bb

[Sample log of test hole 75 feet east and 20 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,491 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	7	7
Sand	11	18
Sand and clay	3	21
Sand	10	31
Clay	13	44
Clay, sandy	11	55
Gravel	1	56
Pierre shale:		
Shale, fragmental	3	59
Shale, blue	1	60

B3-53-25ab

[Driller's log of test hole 100 feet north of southeast corner of quarter-quarter section, drilled by the State of Colorado, 1906]

Pleistocene and Recent deposits, undifferentiated:		
Sand and gravel	85	85
Pierre shale:		
Shale	70	155
Lime	2	157
Shale	148	305
Lime	3	308
Shale	192	500
Shale, light-gray	23	523
Lime	2	525
Shale	252	777
Shale, light-gray	125	902
Lime	2	904
Shale	242	1,146

B5-54-2bd

[Driller's log of test hole drilled by Mr. Woberman, 1930. Surface altitude, 4,085.2 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	14	14
Gravel	76	90

B5-54-5aa

[Driller's log of domestic well drilled by Mr. Vanes. Surface altitude, 4,087.9 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand and clay	5	5
Sand	17	22
Clay	6	28
Gravel	24	52
Pierre shale:		
Shale	100	152

B5-54-5cc

[Sample of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 4,090 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, black	3	3

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WASHINGTON COUNTY, COLO.—Continued

B5-54-5cc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, medium to coarse, pink to tan	15	18
Sand, medium to coarse, light-tan	5	23
Sand, coarse to very coarse, and fine to medium gravel, pink to tan	10	33
Sand, medium light-tan	10	43
Gravel, medium, pink to tan	2	45
Pierre shale:		
Shale, black to bluish-black	18	63

B5-54-8bd

[Sample log of test hole 30 feet west and 60 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1949. Surface altitude, 4,086 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium; contains clay; black to dark-brown	2	2
Sand, medium and coarse, brown	4	6
Gravel, fine to coarse, pink to tan	17	23
Gravel, fine to medium; contains 20 percent sand; pink to tan	20	43
Gravel, medium to coarse, pink to tan	35.5	78.5
Pierre shale:		
Clay, yellow to brown to gray	4.5	83
Clay, blue-gray to gray with yellow-brown streaks	10	93

B5-54-16bd

[Sample log of test hole drilled for U. S. Geological Survey, 1949. Surface altitude, 4,102 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, tough, black	3	3
Clay, very tough, tan	7	10
Sand, fine; contains medium gravel; pink to tan	55	65
Clay, tan	5	70
Sand, fine; contains medium gravel; pink to tan	53	123
Clay, tough, light-tan	10	133
Clay, mottled light-tan and dark-gray	10	143
Clay, dark-gray	8	151
Gravel, coarse, interbedded with clay	2	153
Gravel, fine to coarse, interbedded with clay	99	252
Pierre shale:		
Shale, blue to black	8	260

B5-54-17aa

[Sample log of test hole 5 feet west and 250 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1942. Surface altitude, 4, 102 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium, light-tan	4	4
Sand, coarse; contains fine to medium gravel	3	7
Gravel, medium to coarse, pink to tan	6	13
Gravel, fine; contains 20 percent coarse to very coarse sand; tan	10	23
Gravel, fine to medium; contains 10 percent coarse gravel; pink to tan	10	33
Gravel, medium to coarse, pink to tan	20	53
Gravel, medium to coarse; contains 10 percent very coarse gravel and pebbles; pink to tan	10	63
Gravel, fine to medium; contains 15 percent coarse sand; pink to tan	10	73
Gravel, medium to coarse, pink to tan	20	93
Gravel, medium to coarse, pink to tan; contains reworked tan clay	10	103
Gravel, fine to medium, and coarse sand, pink to tan	10	113

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WASHINGTON COUNTY, COLO. — Continued

B5-54-17aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine to coarse, pink to tan	7	120
Clay, sandy, light-gray	5	125
Gravel, fine to medium, pink to tan	8	133
Gravel, fine to medium, pink to tan; contains light-gray sandy clay	10	143
Clay, yellow to brown; contains some gravel	13	156
Pierre shale:		
Clay, blue to black	7	163

B5-54-19da

[Driller's log of test hole drilled by Mr. Woberman. Surface altitude, 4,116.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Gravel	9	15
Gravel, coarse, and sand	88	103

B5-54-28cb

[Driller's log of test hole drilled by Adams Well Works, 1944]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine	58	58
Gravel	12	70
Pierre shale:		
Shale	1	71

B5-54-29cb

[Driller's log of irrigation well drilled in 1937. Surface altitude, 4,126.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand and silt	20	20
Sand, fine	42	62
Gravel	10	72

B5-54-30db

[Driller's log of test hole]

Pleistocene and Recent deposits, undifferentiated:		
Soil and silt	16	16
Gravel, medium and coarse	19	35
Sand, very fine to fine	5	40
Gravel	44	84
Pierre shale:		
Shale	1	85

WELD COUNTY, COLO.

B1-61-5cc

[Driller's log of test hole drilled in 1935. Surface altitude, 4,783 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	21	21
Gravel	54	75

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-61-5dc

[Sample log of test hole 50 feet west and 52 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,773 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	7	11
Clay and sand	7	18
Gravel, clay, and sand	5	23
Clay	7	30
Laramie formation:		
Shale, fragmental, gray	4	34
Shale, blue; contains fragments of coal	6	40

B1-61-11bb

[Sample log of test hole 13 feet east and 16 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,844 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	6	6
Clay	15	21
Sand, fine, and clay	12	33
Clay	8	41
Clay and sand	15	56
Gravel, sand, and clay	3	59
Laramie formation:		
Shale, gray and yellow	28	87
Shale, blue; contains streaks of coal	7	94
Shale, black	6	100

B1-61-19c

[Driller's log of domestic well drilled in 1919]

Pleistocene and Recent deposits, undifferentiated:		
Silt, sand, and clay	50	50
Laramie formation:		
Shale	212	262

B1-61-26c

[Driller's log of domestic well drilled by Mr. Oberquell, 1921]

Pleistocene and Recent deposits, undifferentiated:		
Soil and sand	50	50
Laramie formation:		
Shale, jointed, blue	175	225
Sand, blue	30	255
Shale, jointed, blue	55	310
Sand, blue	30	340
Shale	8	348
Sand, blue	33	381
Shale	2	383

B1-61-27c

[Driller's log of well drilled by Mr. Oberquell, 1915]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sand, and fine gravel	50	50

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. —Continued

B1-61-27c—Continued

	Thickness (feet)	Depth (feet)
Laramie formation:		
Shale, blue	150	200
Sand, blue	18	218
Shale, blue	1	219

B1-61-30c

[Driller log of stock well drilled by Mr. Oberquell, 1927]

Pleistocene and Recent deposits, undifferentiated:		
Soil, clay, and sand	50	50
Laramie formation:		
Shale, blue	100	150
Coal	7	157
Shale	124	281

B1-61-35a

[Driller's log of stock well drilled by Mr. Oberquell, 1915]

Pleistocene and Recent deposits, undifferentiated:		
Sand and gravel	50	50
Laramie formation:		
Clay and shale; blue	175	225
Sandstone and shale; blue	25	250

B1-62-1cc

[Sample log of test hole 22 feet east and 30 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,921 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand	4	4
Loam	11	15
Clay	4	19
Laramie formation:		
Shale, lignitic, gray	21	40
Shale, yellow	4	44
Shale, gray	73	117
Shale, blue	23	140

B1-62-1d

[Driller's log of stock well drilled by Mr. Oberquell, 1916]

Pleistocene and Recent deposits, undifferentiated:		
Soil, sand, and gravel	60	60
Laramie formation:		
Shale, blue	40	100
Sandstone	7	107
Shale, blue	58	165

B1-62-5aa

[Driller's log of test hole drilled by Holden and Holden, 1947. Surface altitude, 4,840.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	24	24
Rock	2	26

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. — Continued

B1-62-5aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel	2	28
Clay	52	80
Laramie formation:		
Shale	96	176
Sandstone	22	198

B1-62-7aa

[Sample log of test hole 200 feet west and 80 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,798 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay and sand	9	13
Sand; contains some clay	4	17
Gravel	5	22
Clay	3	25
Gravel	8	33
Gravel and clay	5	38
Laramie formation:		
Shale, carbonaceous	22	60

B1-62-10bb

[Sample log of test hole 17 feet east and 73 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,940 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Clay	14	18
Laramie formation:		
Shale, fragmental, yellow	4	22
Shale, fragmental, gray	11	33
Sandstone	2	35
Shale, gray and yellow	10	45
Shale, gray; contains streaks of coal	15	60

B1-63-2cc

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,846 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay, sandy	8	10
Sand, fine	5	15
Gravel, sandy	6	21
Clay	9	30
Sand, fine	8	38
Sand, coarse, and gravel	4	42
Clay	1	43
Sand and gravel	8	51
Clay	1	52
Sand, coarse	11	63
Clay	1	64
Sand and gravel	1	65
Clay	12	77
Sand and gravel	1	78
Clay	3	81
Sand and gravel	4	85
Sand, fine	5	90
Clay	8	98

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. — Continued

B1-63-2dc

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,832 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	6	8
Clay, sandy	7	15
Sand, coarse	5	20
Clay	5	25
Sand and gravel	37	62
Clay	7	69

B1-63-3bc

[Driller's log of irrigation well drilled by Oliver Well Works, 1936. Surface altitude, 4,840.5 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	45	45
Sand	11	56
Clay, sandy	10	66
Gravel, fine	5	71
Clay	10	81
Gravel and clay	9	90
Clay, sandy	5	95
Sand, dirty	10	105
Gravel	23	128

B1-63-3cc

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,844.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Sand	4	6
Sand and silt	42	48
Sand, fine	2	50
Sand and gravel	2	52
Sand	3	55
Sand and gravel	16	71
Clay	5	76
Sand, coarse	5	81
Sand and gravel	9	90
Clay	8	98
Sand and gravel	7	105
Sand	10	115
Sand and gravel	5	120
Sand, coarse	2	122
Clay, black	1	123
Sand	1	124
Laramie formation:		
Shale	1	125

B1-63-3dd

[Driller's log of test hole drilled by Mr. Claycomb, 1943. Surface altitude, 4,841.4 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and clay	40	40
Sand and fine gravel	30	70
Clay	4	74
Gravel, medium	6	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. — Continued

B1-63-3dd--Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	1	81
Sand, fine, gravel, and clay	14	95
Clay	1	96
Sand, fine	6	102

B1-63-6aa

[Sample log of test hole 20 feet west and 35 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1947. Surface altitude, 4,842 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, brown	3	3
Gravel, fine, sandy, poorly sorted, gray to brown	3	6
Laramie formation:		
Shale, weathered, plastic, and cohesive, mottled blue and brown	14	20

B1-63-8ab

[Driller's log of test hole drilled by Layne-Western Co., 1937. Surface altitude, 4,864 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay, sandy	23	25
Sand	5	30
Sand and gravel	8	38
Laramie formation:		
Shale	5	43

B1-63-9ba

[Driller's log of test hole drilled by Layne-Western Co., 1933]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay, sandy	28	30
Sand, coarse	2	32
Sand and gravel	6	38
Sand, coarse	7	45
Sand and gravel	30	75
Sand, coarse	10	85
Sand and gravel	8	93
Clay	1	94
Sand and gravel	2	96
Clay	2	98
Sand and gravel	5	103
Laramie formation:		
Shale	7	110

B1-63-9ad1

[Driller's log of irrigation well drilled by Oliver Well Works, 1937. Surface altitude, 4,852.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, hard	30	30
Clay, soft	10	40
Clay, hard	10	50
Clay	11	61
Sand, coarse	9	70

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. — Continued

B1-63-9ad1—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay, soft	1	71
Sand, coarse	3	74
Clay, soft	3	77
Sand, fine	3	80
Clay	3	83
Sand	5	88
Clay	1	89
Sand	4	93
Clay	5	98
Sand, hard	7	105
Sand	6	111
Clay	4	115
Sand	13	128

B1-63-9dd

[Driller's log of test hole drilled by Oliver Well Works, 1935. Surface altitude, 4,862.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	45	45
Sand, fine	13	58
Clay, hard	4	62
Gravel and cobbles	3	65
Clay, hard	9	74
Sand, fine	6	80
Clay	4	84
Sand, fine	18	102
Clay, hard	2	104
Sand, fine	7	111
Clay	2	113
Gravel, coarse	5	118

B1-63-10cd

[Driller's log of irrigation well drilled by Oliver Well Works, 1933. Surface altitude, 4,865.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	29	29
Sand, coarse, and gravel	2	31
Sand, fine, and gravel	3	34
Sand, coarse, and gravel	65	99
Clay	2	101
Sand, coarse, and gravel	38	139

B1-63-12ab

[Sample log of test hole 4 feet east and 26 feet north of southwest corner of quarter-quarter section, drilled for U S. Geological Survey, 1947. Surface altitude, 4,836 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	7	7
Sand	6	13
Gravel and sand	10	23
Laramie formation:		
Shale, gray	17	40

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-63-12c

[Driller's log of domestic well drilled by Mr. Williams]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay, sandy	28	30
Laramie formation:		
Shale	70	100

B1-63-15cc

[Driller's log of irrigation well drilled by Mr. Johnstown, 1933. Surface altitude, 4,901.6 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, and clay	25	25
Sand, and clay	7	32
Sand, coarse, and gravel	16	48
Sand, coarse, gravel, and boulders	2	50
Sand, coarse, and gravel	2	52
Clay	4	56
Sand, coarse, and clay	3	59
Sand, coarse, and fine gravel	22	81
Clay, sandy	1	82
Sand, coarse, and gravel	11	93
Sand, coarse, and clay	4	97
Sand, coarse	19	116
Sand, coarse, and gravel	4	120
Sand, gravel, and boulders	6	126
Sand, coarse	21	147

B1-63-15dc1

[Driller's log of irrigation well drilled by Oliver Well Works, 1944. Surface altitude, 4,906.6 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	42	42
Gravel	4	46
Clay	56	102
Gravel	13	115
Clay	20	135
Gravel, dirty	21	156
Laramie formation:		
Shale	1	157

B1-63-16ad

[Driller's log of test hole drilled by Holden and Holden, 1940. Surface altitude, 4,886.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine	14	14
Clay, sandy	11	25
Clay	10	35
Clay, sandy	8	43
Sand	29	72
Gravel	4	76
Clay, hard	3	79
Sand	14	93
Clay, soft	1	94
Gravel	47	141

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-63-16ad—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	1	142
Laramie formation:		
Shale	1	143

B1-63-19b

[Driller's log of test hole drilled in 1934]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Clay, yellow	10	25
Clay, blue	3	28
Clay, sandy, yellow	10	38
Laramie formation:		
Shale	2	40

B1-63-20dd

[Driller's log of test hole drilled by Oliver Well Works. Surface altitude, 4,918 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	16	16
Gravel	2	18
Clay	37	55
Gravel	8	63
Clay	28	91
Gravel	6	97
Clay	14	111

B1-63-22ac2

[Driller's log of irrigation well drilled by Mr. Holden, 1944. Surface altitude, 4,909.9 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Gravel	165	165

B1-63-23cc

[Driller's log of test hole drilled by Layne-Western Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	4	4
Clay, sandy	13	17
Sand, coarse	5	22
Sand, coarse, and gravel	25	47
Clay	4	51
Sand, coarse, and gravel	5	56
Clay	30	86
Sand and gravel	8	94
Clay	3	97
Sand, coarse, and gravel	7	104
Clay	26	130
Sand, coarse	2	132
Clay	16	148

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. —Continued

B1-63-27cb

[Driller's log of irrigation well drilled by Mr. Voght, 1933. Surface altitude, 4,948.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and sand	95	95
Gravel	8	103
Clay	1	104
Gravel	55	159

B1-63-28aa

[Driller's log of test hole drilled by Layne-Western Co., 1933]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	32	32
Sand, fine	2	34
Sand, coarse, and gravel	6	40
Sand, fine	16	56
Sand, coarse, and gravel	9	65
Sand, fine	2	67
Sand, coarse, and gravel	11	78
Sand, coarse, and clay balls	6	84
Sand, coarse, and gravel	46	130
Sand, fine	2	132
Sand, coarse, gravel, and cobbles	14	146

B1-63-30aa

[Driller's log of test hole drilled by Layne-Western Co., 1933]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	10	10
Sand, medium	4	14
Sand, coarse, and gravel	3	17
Sand, coarse, and clay balls	3	20
Sand, coarse, and gravel	11	31
Clay and gravel	16	47
Sand, coarse	7	54
Clay	2	56
Sand and clay	4	60
Sand, coarse, and gravel	4	64

B1-63-30ba

[Driller's log of test hole drilled by Layne-Western Co., 1933]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy	5	5
Sand, fine	11	16
Clay, sandy	6	22
Sand, coarse	4	26
Sand and clay	1	27
Sand, coarse, and gravel	13	40
Clay	20	60
Laramie formation:		
Clay, blue	10	70

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B1-64-25ab

[Driller's log of test hole drilled by Layne-Western Co., 1933]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	19	19
Sand, fine	7	26
Gypsum(?), hard	26	52
Laramie formation:		
Shale, blue	24	76

B1-64-25bb

[Driller's log of test hole drilled by Layne-Western Co., 1933]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	12	12
Clay, hard, sandy, blue	20	32
Sand, fine	8	40
Sand, medium	16	56
Laramie formation:		
Shale, blue	2	58

B1-64-25cb

[Driller's log of well drilled by Holden and Holden]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	4	4
Clay	8	12
Clay, sandy	5	17
Gravel	7	24
Sand, fine	11	35
Clay, hard	1	36
Sand, fine	1	37

B2-61-2ac

[Driller's log of test hole drilled by Mr. Holden, 1938. Surface altitude, 4,635.5 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand, fine	31	34
Gravel, fine	16	50
Clay	2	52
Clay, sandy	8	60
Sand, coarse	12	72

B2-61-8bb

[Sample log of test hole 147 feet east and 33 feet south of northwest corner of section, drilled for U. S. Geological Survey, 1948]

Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine, and silt, reddish-tan	7	7
Sand, fine, calcareous, tan to yellow	21	28
Sand, very fine; contains clay and silt; calcareous, tan	10	38
Silt and clay, calcareous, blue	27	65
Clay and silt; contains concretions; mottled yellow and gray	10	75
Laramie formation:		
Shale, soft, blue to gray	5	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-61-11bd

[Driller's log of irrigation well drilled in 1935]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	4	8
Clay, yellow	11	19
Sand, fine	6	25
Sand, coarse	5	30
Gravel	18	48
Clay	1	49
Gravel	14	63
Sand, black	22	85

B2-62-4cd

[Sample log of test hole 10 feet north of southeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, brown	4	4
Clay; contains fine sand; brown	2	6
Sand, medium, and clay, tan	3	9
Clay; contains fine sand; tan	3	12
Sand, fine to medium, buff	15	27
Clay; contains medium to fine sand	17	44
Laramie formation:		
Shale, weathered; contains iron concretion, buff to brown becoming blue to black. Seam of lignite found at 50 feet	6	50

B2-62-18ab

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1944. Surface altitude, 4,731.1 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	15	15
Clay	2	17
Sand	4	21
Clay	17	38
Sand	5	43
Gravel	39	82

B2-62-30cb

[Driller's log of irrigation well drilled by Oliver Well Works, 1937. Surface altitude, 4,776.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	31	31
Gravel	4	35
Clay	9	44
Gravel	9	53
Clay	2	55
Gravel	4	59
Clay	13	72
Gravel, fine	7	79
Laramie formation:		
Sandstone, friable	1	80

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-62-31bb

[Driller's log of stock well drilled by Holden and Holden]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	87	87
Laramie formation:		
Shale	5	92
Rock	1	93
Shale, soft	53	146
Rock	1	147
Shale	43	190
Shale, hard	15	205
Shale, soft	15	220
Rock	1	221
Shale, hard	12	233
Rock	1	234
Shale, hard	8	242
Rock	1	243
Shale, hard	11	254
Rock	1	255
Shale, soft	20	275
Shale, hard	25	300
Shale, soft	10	310
Rock	1	311
Shale, soft	5	316

B2-63-12aa

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,715 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, dark-brown	4	4
Clay and fine sand, tan	4	8
Sand, medium to coarse, brown	14	22
Clay; contains fine and medium sand; brown	20	42
Gravel, coarse to medium	2	44
Clay; contains fine sand and calcareous nodules; brown	8	52
Gravel, medium to coarse, pink to tan; contains yellow clay	4	56
Clay, sandy, calcareous, brown	2	58
Gravel, medium to coarse, pink to tan	23	81
Clay, sandy, brown	19	100
Gravel, medium to coarse, pink to gray	5	105
Gravel; contains clay and pebbles of chert as large as 2 inches	10	115
Fox Hills sandstone:		
Sandstone, hard, thin-bedded, medium to fine-grained; contains iron concretions; gray to brown	2	117

B2-63-15dc

[Driller's log of test hole drilled by the Denver Pump Co., 1940. Surface altitude, 4,760.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil, silt, and fine sand	47	47
Sand and gravel	29	76
Clay	1	77
Sand	2	79
Clay, sandy	5	84
Laramie formation:		
Shale	4	88

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-18dd

[Sample log of test hole 20 feet west and 5 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,870 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy; contains silt and clay; brown	13	13
Laramie formation:		
Shale, mottled tan and brown	7	20

B2-63-21dd

[Driller's log of test hole drilled by Oliver Well Works. Surface altitude, 4,768 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	10	10
Clay	25	35
Clay, sandy	25	60
Clay	13	73
Clay, soft, sandy	6	79
Laramie formation:		
Shale	2	81

B2-63-22dc

[Driller's log of test hole drilled by Mr. McArthur, 1933. Surface altitude, 4,783.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	23	23
Clay	20	43
Sand	8	51
Clay	3	54
Sand	6	60
Clay	1	61
Sand, coarse	6	67
Clay	1	68
Gravel	18	86
Clay	5	91
Sand, hard, blue	3	94
Gravel, medium	8	102
Laramie formation:		
Shale	2	104

B2-63-23dc

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,786 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay	5	7
Clay, sandy	11	18
Sand, fine	7	25
Clay	13	38
Sand and gravel	10	48
Sand, coarse	3	51
Clay	3	54
Sand	4	58
Sand and gravel	12	70
Clay	5	75
Sand	3	78
Clay	6	84
Sand, fine, and gravel	6	90
Clay	13	103

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-23dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine	15	118
Sand, fine, and gravel	6	124
Fox Hills sandstone:		
Shale	1	125

B2-63-25ab1

[Driller's log of irrigation well drilled by Canfield Drilling Co., 1940. Surface altitude, 4,776 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	8	8
Sand	10	18
Clay	5	23
Gravel	15	38
Clay	2	40
Gravel	29	69
Laramie formation:		
Shale	6	75

B2-63-25dc

[Driller's log of test hole drilled by Oliver Well Works, 1936]

Pleistocene and Recent deposits, undifferentiated:		
Soil	12	12
Sand	8	20
Sand and clay	16	36
Clay	3	39
Gravel	7	46
Clay	2	48
Gravel	4	52
Clay	2	54
Laramie formation:		
Shale	6	60

B2-63-26ad1

[Driller's log of irrigation well drilled by Holden and Holden, 1941. Surface altitude, 4,788.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	34	34
Sand	10	44
Clay, soft	1	45
Sand	16	61
Clay, hard	1	62
Gravel	14	76
Clay	1	77
Gravel, medium	9	86
Clay	16	102
Clay, sandy	20	122

B2-63-26cd

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,804 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-26cd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay, sandy	27	29
Clay	9	138
Sand, coarse	2	40
Sand, coarse, and gravel	54	94
Clay	2	96
Clay and fine sand	5	101
Sand, fine	12	113
Clay	2	115
Sand, fine	5	120
Sand, fine, and gravel	8	128
Laramie formation:		
Shale	1	129

B2-63-27ad

[Driller's log of test hole drilled by the Denver Pump Co., 1934. Surface altitude, 4,792.0 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	37	37
Sand and clay, yellow	5	42
Sandstone	39	81
Clay, sandy	5	86
Gravel, medium and coarse	10	96
Sand, white	6	102
Laramie formation:		
Clay and shale, dark-blue	4	106

B2-63-27dc

[Driller's log of test hole drilled by Layne-Western Co., 1933. Surface altitude, 4,809 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Clay and fine sand	18	20
Clay	26	46
Sand, coarse	12	58
Clay	12	70
Sand and clay	3	73
Sand	2	75
Sand and clay	1	76
Sand, coarse, and gravel	12	88
Laramie formation:		
Limestone	1	89

B2-63-28dc

[Driller's log of irrigation well drilled by Herring and Repp, 1933. Surface altitude, 4,805.7 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	26	26
Sand	5	31
Clay, sandy	2	33
Sand	3	36
Clay	2	38
Sand	3	41
Clay	2	43
Sand	6	49
Clay	1	50
Sand	2	52

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B2-63-28dc—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Clay	1	53
Sand	1	54
Clay	1	55
Sand	3	58
Clay	6	64
Sand	4	68
Gravel	2	70
Clay	1	71
Sand	7	78
Laramie formation:		
Shale	2	80

B2-63-33dd1

[Driller's log of irrigation well drilled by Oliver Well Works, 1935. Surface altitude, 4,836.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, hard	35	35
Clay, sandy	12	47
Clay, hard	5	52
Clay, sandy	21	73
Sand, fine	13	86
Clay	1	87
Sand, coarse	3	90

B2-63-34cc

[Driller's log of test hole drilled by Holden and Holden, 1937. Surface altitude, 4,830.3 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	46	46
Sand	1	47
Clay	10	57
Gravel	6	63
Clay	1	64
Gravel	22	86
Clay	1	87
Gravel	6	93
Clay	3	96
Sand and silt	2	98
Gravel	7	105
Clay	3	108
Laramie formation:		
Shale	1	109

B2-63-35ac

[Driller's log of test hole drilled by Holden and Holden, 1945. Surface altitude, 4,806.4 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	18	18
Sand	9	27
Clay, hard	6	33
Gravel	20	53
Clay, hard	3	56
Gravel	16	72
Clay, hard	2	74
Gravel	5	79
Clay, soft	14	93

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. —Continued

B2-63-35cc2

[Driller's log of irrigation well drilled by Holden and Holden, 1939. Surface altitude, 4,824.8 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	46	46
Sand	19	65
Clay, hard	2	67
Clay, sandy	7	74
Clay, hard	9	83
Clay, sandy	7	90
Gravel	18	108
Clay	6	114

B2-63-35dc

[Driller's log of test hole drilled by Holden and Holden, 1940. Surface altitude, 4,814.3 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	34	34
Sand and clay	5	39
Sand	2	41
Sand, coarse	6	47
Clay	2	49
Sand, coarse, and gravel	9	58
Clay	.5	58.5
Sand, coarse	2.5	61
Clay	2.5	63.5
Sand and gravel	3.5	67
Clay and fine sand	12	79
Sand, fine, and clay	33	112
Laramie formation:		
Shale	7	119

B2-63-36cc

[Driller's log of test hole drilled by Holden and Holden, 1936]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay	20	20
Sand	10	30
Clay	2	32
Gravel	9	41
Clay	1	42
Gravel, sand, and silt	20	62
Clay	5	67
Laramie formation:		
Shale, soft	23	90
Shale, adhesive	40	130
Rock	1	131
Shale, light-blue	13	144
Rock, hard	1	145
Shale, sticky, dark	62	207
Shale, hard, sandy	12	219
Rock	1	220
Shale, soft	1	221
Rock	1	222
Shale, sandy, gray	12	234
Shale, adhesive	6	240

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B3-61-16ab

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4, 650 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, brown	68	68
Sand, fine to medium, and silt, light-tan to brown	6	74
Pierre shale:		
Shale, weathered, silty, calcareous, brown	24	98
Shale, laminar, brittle, blue to black	2	100

B3-61-36bc

[Driller's log of irrigation well drilled by Mr. Holden, 1937. Surface altitude, 4,628.6 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium	2	2
Sand and clay	3	5
Sand and silt	18	23
Gravel	85	108

B3-62-15ac

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4, 611 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay and fine sand; calcareous, brown	5	5
Sand, fine, iron-oxide stains, brown	5	10
Sand, fine to medium, and fine to medium gravel; calcareous, brown	7	17
Sand, fine, and clay and silt; tan	10	27
Sand, fine to medium, and gravel; brown	3	30
Sand, clayey, blue to brown	20	50
Clay; contains 30 percent fine and medium sand; brown	3	53
Clay, sandy, blue	11	64
Sand, medium to coarse; contains clay and gravel; brown	19	83
Sand, medium to fine, brown	7	90
Sand, medium to coarse, tan to brown	28	118
Gravel, fine to coarse; contains medium and coarse sand and some clay; brown	14	132
Pierre shale:		
Shale, sandy, blue to gray	6	138

B3-62-29ac

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,680 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, brown to black	2	2
Sand, medium to coarse, tan	25	27
Clay, blue to gray; contains layers of sand	7	34
Sand, medium to coarse, clayey, tan	13	47
Clay; contains fine sand; blue to gray	15	62
Gravel, medium to coarse; contains sand and pellets of clay; tan to gray	22	84
Gravel, coarse, red to gray	27	111
Gravel, coarse; contains pellets of clay and cobbles; gray	14	125
Fox Hills sandstone:		
Shale, tan to brown to bluish-gray; contains interbedded sandstone	5	130

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B3-63-15aa

[Sample log of test hole 50 feet west and 395 feet south of northeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,787 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, tan	13	13
Clay, sandy, light-brown	5	18
Clay, sandy, light-gray	2	20
Laramie formation:		
Shale; contains sandy layers; brown	10	30
Lignite and soft shale, brown to black	5	35

B3-63-18cb

[Sample log of test hole 400 feet east and 20 feet south of northwest corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,765 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, tan	28	28
Clay and fine to medium sand, tan	13	41
Laramie formation:		
Shale, brittle, thin-bedded, sandy, mottled tan and brown	10	51
Shale, lignitic, brown and black	1	52

B3-63-22dd

[Sample log of test hole 100 feet west and 290 feet north of southeast corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,740 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, gray	40	40
Sand, coarse, blue to gray	26	66
Clay, sandy, blue to black	12	78
Fox Hills sandstone:		
Shale, weathered; contains fragments of calcareous shale and lignite; blue to black	8	86

B3-63-30db

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,840 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, gray to brown	12	12
Clay and sand, calcareous, tan to brown	11	23
Clay, sandy, buff	11	34
Laramie formation:		
Shale, thin-bedded, tan	12	46
Shale, lignitic, brown to black	4	50
Shale, limonite-stained, mottled light- and dark-brown	10	60

B4-61-7dd

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,489 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, buff to brown	3	3
Gravel, medium to coarse, tan to gray	15	18
Sand, very fine, calcareous, brown	19	37
Sand, fine to coarse, and fine gravel, buff to brown	28	65
Gravel, fine to coarse, tan; contains black clay	7	72
Sand, fine to medium, tan to brown; contains blue to gray clay	6	78

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO.—Continued

B4-61-7dd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Gravel, fine to medium, and fine sand, tan to brown	9	87
Gravel, coarse to fine, and fine to medium sand, yellow to tan	27	114
Gravel, very coarse to fine; contains some clay	4	118
Pierre shale:		
Shale, blue	12	130

B4-61-20cc

[Driller's log of irrigation well drilled by Mr. Harshman, 1947. Surface altitude, 4,490 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand and gravel	32	35
Sand, very fine	18	53
Sand, medium to coarse	1	54
Sand, fine, and clay	8	62
Sand, fine	6	68
Sand, fine to medium	7	75
Sand, fine to coarse	3	78
Sand; contains pebbles and cobbles	7	85
Gravel, interbedded with clay	51	136

B4-62-6a

[Driller's log of test hole drilled by Mr. Hay, 1934]

Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	25	25
Clay	14	39
Sand and clay	8	47
Sand, slightly cemented	7	54
Gravel, fine	2	56
Clay, yellow	4	60
Pierre shale:		
Shale, very sandy	16	76

B4-62-25bd

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,508 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, tan to brown	4	4
Sand, fine to medium, gray	14	18
Sand, fine to medium, yellow to brown	7	25
Sand, fine to medium, and clay, blue to gray	36	61
Sand, fine to medium, buff	16	77
Sand, medium to coarse, and fine gravel, brown	4	81
Sand, fine to medium, tan to brown	16	97
Gravel, fine to coarse, sandy, brown	12	109
Gravel, fine to medium, tan to gray	6	115
Pierre shale(?):		
Sandstone, fine-grained, brown	1	116

B4-62-35cd

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,566 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, tan to brown	25	25

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B4-62-35cd—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine to medium, gray	8	33
Sand, fine to medium, light-tan	40	73
Sand, coarse, light-tan	31	104
Gravel, fine to medium, and clay, brown	10	114
Pierre shale:		
Sandstone, friable, tan to gray	2	116

B4-63-4dd

[Driller's log of stock well drilled by Mr. Hay, 1934]

Pleistocene and Recent deposits, undifferentiated:		
Soil and clay	36	36
Sand, fine	20	56
Gravel, fine, and sand	32	88
Fox Hills sandstone:		
Shale	1	89

B4-63-6cc

[Driller's log of test hole drilled by Oliver Well Works, 1946. Surface altitude, 4,608 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	16	16
Sand	4	20
Clay	4	24
Sand	8	32
Clay	10	42
Sand	6	48
Clay	4	52
Sand	2	54
Clay	2	56
Sand	8	64
Sand, coarse	6	70
Cobbles	2	72
Sand	8	80
Fox Hills sandstone:		
Shale	1	81

B4-63-14ad

[Driller's log of test hole drilled by Holden and Holden, 1941]

Pleistocene and Recent deposits, undifferentiated:		
Sand	26	26
Clay	1	27
Sand	1	28
Clay	8	36
Fox Hills sandstone:		
Sandstone	18	54
Pierre shale:		
Shale	96	150
Shale, sandy, gray	41	191
Concretion, gray	1	192
Shale, blue	43	235

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

WELD COUNTY, COLO. — Continued

B4-63-14cc

[Sample log of test hole 35 feet east and 40 feet north of southwest corner of section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4, 695 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, coarse to medium, and fine sand and silt, dark-brown	5	5
Sand, coarse to fine; contains fragments of silt and clay; tan	5	10
Clay, sandy, calcareous, buff	7	17
Gravel, coarse; contains pebbles of sandstone and chert; brown to tan	10	27
Fox Hills sandstone:		
Clay, dark-gray	2	29
Clay; contains fine to medium sand and limonite; brown	3	32
Clay, sandy, light-blue; contains lignite	5	37
Shale, soft, thin-bedded, blue to black	13	50
Sandstone, fine to medium-grained, thin-bedded, tan to gray	10	60

B4-63-34da

[Sample log of test hole 190 feet west and 1,000 feet south of northeast corner of quarter-quarter section, drilled for U. S. Geological Survey, 1948. Surface altitude, 4,775 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, medium to coarse, brown	52	52
Clay and medium sand, tan	23	75
Laramie formation:		
Shale, sandy, lignitic, tan	7	82
Lignite, clayey, soft, dark-brown	1	83
Shale, sandy, tan to brown	2	85

B4-64-2cc

[Driller's log of test hole drilled by Holden and Holden]

Pleistocene and Recent deposits, undifferentiated:		
Soil	3	3
Sand, fine to medium	11	14
Sand, fine	11	25
Sand, coarse	21	46
Clay	1	47
Sand	11	58
Clay and gravel	4	62
Sand and gravel	8	70

B4-64-13bc

[Driller's log of test hole drilled by Holden and Holden]

Pleistocene and Recent deposits, undifferentiated:		
Clay, sandy	13	13
Sand, silty	12	25
Clay	20	45
Sand	2	47
Clay	9	56
Sand, fine to coarse	4	60
Sand, fine	10	70
Gravel	14	84

Logs of test holes, wells, and seiemograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B5-61-7ba

[Driller's log of stock well drilled by Canfield Drilling Co.]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil	4	4
Sand	4	8
Sand and clay	16	24
Clay, hard, sandy	15	39
Fox Hills sandstone:		
Sandstone	1	40

B5-61-10ab

[Driller's log of stock well drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Sand	8	8
Clay and sand	13	21
Sand, cemented, and clay	6	27
Sand and tough clay	2	29
Fox Hills sandstone:		
Shale, sandy, fragmental	5	34
Shale, fragmental, gray	20	54
Shale, blue	6	60

B5-61-16cc

[Driller's log of stock well drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay, tough, and sand	21	26
Clay, jointed, yellow	40	66
Pierre shale:		
Shale, fragmental	7	73
Shale, blue	7	80

B5-61-20cd

[Driller's log of stock well drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Soil	5	5
Clay, tough, and sand	23	28
Pierre shale:		
Shale, fragmental	16	44
Shale, blue	16	60

B5-61-22ac

[Driller's log of stock well drilled by Canfield Drilling Co.]

Pleistocene and Recent deposits, undifferentiated:		
Sand	9	9
Clay and sand	4	13
Clay, hard, and sand	13	26
Pierre shale:		
Shale, sandy, fragmental	12	38
Shale, blue	7	45

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

WELD COUNTY, COLO.—Continued

B5-61-32ad

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,543 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand, fine to medium, and silt; dark-brown	16	16
Sand, fine to medium, and calcareous clay, yellow to brown	5	21
Silt and clay, calcareous, yellow to tan	5	26
Clay, tan to brown	5	31
Pierre shale:		
Sandstone, fine-grained, silty, concretionary, tan to yellow	4	35

B5-63-19ab

[Driller's log of irrigation well drilled by Mr. McMillan, 1940. Surface altitude, 4,554.8 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil	2	2
Gravel	35	37

B5-63-31cc

[Driller's log of irrigation well drilled by Mr. McMillan, 1934. Surface altitude, 4,577 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay	6	6
Sand, fine	54	60
Clay	12	72
Pierre shale:		
Shale	1	73

B5-63-34aa

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,535 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, very fine; contains some coarse sand; dark-brown	6	6
Gravel, fine to medium, and coarse sand; tan to brown	16	22
Sand, fine to medium, tan	8	30
Gravel, fine to very coarse, and sand, tan to gray	26	56
Sand, very fine, calcareous, limonite-stained, yellow to brown	34	90
Sand, very fine, and medium gravel; calcareous, red to tan	7	97
Sand, very fine, and clay, calcareous, mottled red to brown and blue	4	101
Pierre shale:		
Shale, calcareous, blue to gray	9	110

B5-63-35cc

[Sample log of test hole drilled for U. S. Geological Survey, 1948. Surface altitude, 4,522 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, fine, silty, dark-brown	2	2
Sand, coarse, and fine gravel, pink to tan	42	44
Sand, medium to coarse, and silt, brown	29	73
Sand, fine to medium, tan to brown	7	80
Gravel, medium to coarse, and coarse sand, tan to gray	21	101
Sand, fine to medium, calcareous, tan to gray	2	103
Sand, fine to medium, and clay, blue to brown	5	108
Pierre shale:		
Shale, silty, blue to gray	4	112

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.

B12-42-2aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,369 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt, sandy, dark-brown to black	3	3
Clay, very light-green to gray	4	7
Sand, very fine to very coarse, and gravel; contains some pebbles; brown to pink to tan	19.5	26.5
Silt, slightly sandy, light-brown to buff	3.5	30
Sandstone, very fine- to very coarse-grained, pink to tan to brown	4.3	34.3
Sand, fine to coarse and fine gravel; contains interbedded silt; buff	5.7	40
Ogallala formation:		
Silt, slightly sandy, buff to tan	2	42
Silt, slightly clayey, gray to brown	3	45
Silt, slightly sandy, calcareous, light-gray to brown	1.5	46.5
Silt, sandy, light-brown to buff	3.5	50
Sand, silty, light-brown; contains caliche	2	52
Sand and silt; brown to buff to tan	6.5	58.5
Silt, slightly sandy, light-gray to brown	1.5	60
Silt, slightly sandy, reddish-brown to gray	4	64
Clay, light olive-green	4	68
Clay, slightly silty, light-brown to buff; contains caliche	2	70
Brule formation:		
Silt, slightly sandy, blocky, reddish-brown	3.5	73.5
Silt, slightly sandy, gray to brown	1.5	75
Silt, slightly clayey and sandy, brown	10	85
Silt, slightly clayey	5	90

B12-42-2ab

[Driller's log of test hole drilled by Haggard Drilling Co., 1946. Surface altitude, 3,380 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	2	2
Clay	8	10
Sand and gravel	14	24
Clay	5	29
Sand and gravel	9	38
Clay	2	40
Gravel	3	43
Clay	7	50
Gravel	3	53
Clay	3	56
Sand and gravel	6	62
Clay	5	67
Sand and gravel	5	72
Clay	4	76
Sand	2	78
Brule formation(?):		
Clay	11	89

B12-42-2ac

[Driller's log of test hole drilled by Haggard Drilling Co., 1946]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil, sandy	8	8
Sand and gravel	23	31
Clay	2	33
Sand and gravel	8	41
Sand, fine	7	48
Clay, hard, and caliche	15	63

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

DEUEL COUNTY, NEBR.—Continued

B12-42-2ac—Continued

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated—Continued		
Sand and silt	5	68
Sand, coarse	2	70
Clay	4	74
Sand	3	77
Caliche	3	80
Brule formation(?):		
Clay	45	125

B12-42-2cb

[Driller's log of irrigation well drilled by Haggard Drilling Co., 1946. Surface altitude, 3,386 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Clay	8	11
Silt, black	2	13
Gravel	27	40
Clay	4	44
Gravel; contains lenses of clay	10	54
Gravel	15	69

B12-42-2cd

[Driller's log of test hole drilled by Haggard Drilling Co., 1945. Surface altitude, 3,390 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	2	2
Sand	9	11
Gravel	31	42
Sand and clay, hard	18	60
Gravel	3	63
Clay	2	65
Sand and gravel	15	80
Brule formation(?):		
Clay	7	87

B12-42-2dd

[Driller's log of irrigation well drilled by Haggard Drilling Co., 1945. Surface altitude, 3,385 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	8	8
Gravel	40	48
Sand	10	58
Sand and clay	2	60

B12-42-7cc

[Driller's log of irrigation well drilled by Haggard Drilling Co., 1946. Surface altitude, 3,416 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Clay	4	7
Sand	1	8
Clay	5	13
Sand and gravel	24	37

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR. —Continued

B12-42-7cc—Continued

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated—Continued		
Sand, cemented	5	42
Sand and gravel	50	92

B12-42-8dc

[Driller's log of test hole drilled by Haggard Drilling Co., 1946. Surface altitude, 3,416 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Clay	17	20
Gravel	18	38
Clay and caliche	43	81
Sand and gravel	13	94
Caliche, clay, and gravel	4	98
Sand and gravel	11	109
Brule formation:		
Clay	9	118

B12-42-9cc

[Driller's log of test hole drilled by Haggard Drilling Co., 1946. Surface altitude, 3,428 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Sand	8	11
Clay	4	15
Sand and gravel	35	50
Sand and clay, hard	15	65
Clay	3	68
Sand and clay, hard	34	102
Sand and gravel; contains silt	4	106
Gravel, uniform, coarse	9	115
Sand, fine	12	127
Clay	9	136
Sand and gravel	20	156
Brule formation(?):		
Clay	11	167

B12-42-9cd

[Driller's log of test hole drilled by Haggard Drilling Co., 1944. Surface altitude, 3,432.2 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil, sandy	2	2
Sand and gravel	18	20
Clay	7	27
Gravel	53	80
Sandstone	3	83

B12-42-11aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,384 feet]

Road fill	0.5	0.5
Pleistocene and Recent deposits, undifferentiated:		
Silt, clayey, dark-brown to black	2	2.5
Silt, sandy, black	1	3.5
Silt, clayey, gray to brown	4	7.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

DEUEL COUNTY, NEBR. —Continued

B12-42-11aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine to very coarse; contains gravel; brown to pink to tan	2.5	10
Sand and gravel, brown to pink to tan and yellow	50	60
Sand, fine to very coarse; contains some very fine gravel	21.5	81.5
Clay, slightly silty, light olive-green	8.5	90
Clay, blue to green, interbedded with light olive-green clay	20	110
Sand and gravel, yellow to brown to pink to tan	20	130
Sand, very fine to very coarse; contains trace of fine gravel	26	156
Brule formation:		
Clay, silty, light-brown to buff	14	170

B12-42-12bd

[Driller's log of test hole drilled by Haggard Drilling Co., 1945. Surface altitude, 3,403 feet]

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Clay, sandy	5	8
Sand and gravel, hard; contains silt	22	30
Gravel, coarse	33	63
Clay	7	70
Gravel	36	106

B12-42-13cc

[Driller's log of test hole drilled by Haggard Drilling Co]

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Clay	15	18
Sand and gravel	60	78
Brule formation(?):		
Clay	4	82

B12-42-14aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,446 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Sand and silt, brown to black	1	1
Gravel; contains some coarse sand; tan	4	5
Sand, very fine to very coarse, interbedded with silt, brown	9.5	14.5
Ogallala formation:		
Silt, sandy; contains caliche; brown to gray	55.5	70
Silt, slightly sandy, white to buff	12.5	82.5
Silt, calcareous, gray to white	2.5	85
Silt, slightly sandy, light-brown to gray	10	95
Silt, calcareous, slightly sandy, brown to gray to white	10	105
Silt, slightly sandy, buff to light-gray	21	126
Sand, fine to coarse; contains caliche; gray to yellow to brown	4	130
Silt, gray to brown	13	143
Sand, very fine to coarse, yellow to brown to pink to tan	12.5	155.5
Silt, light-brown to buff	4.5	160
Brule formation:		
Clay, slightly silty, red to brown	20	180

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-42-16cd

[Driller's log of test hole drilled by Haggard Drilling Co., 1945]

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Sand and gravel	25	28
Gravel, silty, interbedded with caliche	9	37
Sandstone(?)	13	50
Clay and caliche	65	115
Sand, fine, silty	2	117
Sand and gravel	34	151
Clay	4	155
Gravel	10	165
Brule formation:		
Clay; contains caliche	31	196

B12-42-17ca

[Driller's log of test hole drilled by Haggard Drilling Co. Surface altitude, 3,434.3 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Clay and sandy clay	25	25
Gravel	12	37
Clay	6	43
Gravel	31	74
Clay	2	76

B12-42-18ac

[Driller's log of irrigation well drilled by Haggard Drilling Co. Surface altitude, 3,434.6 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Clay, sandy	10	10
Sand and gravel	5	15
Sand, fine	8	23
Gravel	20	43
Limestone and clay	3	46
Brule formation(?):		
Clay	2	48

B12-42-19aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,494 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, silty, and road fill	1	1
Silt, dark-gray to tan; contains some coarse sand	9	10
Silt, sandy, red to white; contains a few pebbles	3	13
Ogallala formation:		
Silt, slightly sandy, calcareous, white to red	9	22
Silt, slightly clayey and sandy, reddish-brown	3	25
Silt, slightly clayey and sandy, reddish-brown; contains calcareous nodules	2	27
Clay, sandy and silty, brown	3	30
Sand, very fine to medium, silty, reddish-brown; contains caliche	5	35
Silt, and very fine sand, interbedded with very coarse sand and caliche, brown	6.5	41.5
Clay, slightly sandy, light-brown to tan	3.5	45
Silt, slightly clayey, light-brown to buff	5	50

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-42-19aa—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Clay, slightly silty, light reddish-brown; contains caliche	4	54
Silt, light-brown; contains calcareous nodules	6	60
Silt, slightly sandy, light-brown to tan	7.5	67.5
Silt, slightly sandy and clayey, light-brown; contains caliche	2.5	70
Sand, fine to very coarse, brown pink to tan; contains caliche	17.5	87.5
Clay, greenish-brown	2.5	90
Sand, fine to very coarse; contains fine to medium gravel; brown to pink to tan	26.5	116.5
Silt, light-brown to tan	1	117.5
Silt, calcareous, slightly sandy, green to white	7.5	125
Silt, slightly sandy, green to brown	5	130
Silt, light-gray	5.5	135.5
Silt to siltstone; contains some coarse gravel; tan to brown to gray	13.5	149
Brule formation:		
Clay, blocky, brown	6	155
Clay, slightly silty, reddish-brown	75	230
Clay, slightly silty, sandy, reddish-tan	7	237
Clay, slightly silty, blocky, mottled reddish-brown and olive-green	13	250
Clay, very silty, light-tan to gray	5	255
Clay, slightly silty, blocky, light reddish-brown	5	260
Clay, slightly silty, pale olive-green	20	280
Clay, silty, blocky, light-tan to green	10	290
Clay, slightly silty, blocky, reddish-brown	3	293
Clay, sandy, silty, dark-green	5	298
Sand, very fine to medium, pale-green	2	300
Caliche, sandy	3.5	303.5
Silt, sandy, pale-green	1.5	305
Clay, slightly silty, pale- to dark-green	5	310
Clay, slightly silty, blocky, reddish-brown	10	320
Chadron formation(?):		
Clay, slightly silty, green to brown	5	325
Clay, slightly sandy, silty, blocky, green to brown	5	330
Clay, slightly silty, olive-green	5	335
Clay, silty, pale-green	10	345
Clay, slightly silty, olive-green	5	350
Clay, silty, pale-green	10	360
Clay, sandy, silty, blocky, green	30	390
Clay, slightly silty, pale-green	20	410
Clay, slightly silty, blocky; contains volcanic ash; light-brown to green	5	415
Sand, medium to coarse, silica cement	10	425
Sand, fine to coarse, green	25	450
Silt, very fine sand, light-green	10	460
Pierre shale:		
Clay, dark-gray	20	480

B12-42-21bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,498 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil and fine sand, silty, gray to black	2.5	2.5
Silt, brown to gray	2	4.5
Sand, very fine to very coarse, interbedded with silt, tan to brown	15.5	20
Silt, reddish-brown; contains some sand	5	25
Silt, grayish-brown; contains some sand	2.5	27.5
Silt, sandy, light-brown	2.5	30
Sand, silty, buff to light-brown	5	35
Ogallala formation:		
Sand, silty, tan; contains calcareous zones	5	40
Silt, slightly sandy, light-tan to reddish-brown; contains hard calcareous zones	20	60

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-42-21bb—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Sand, very fine to medium, silty, light-brown to red	10	70
Sand, very fine, to silt, light-brown to tan; contains partly cemented zones	10	80
Silt, slightly sandy, greenish-gray	10	90
Clay, slightly silty, light olive-green	1	91
Silt, slightly sandy, whitish-gray	4	95
Silt, slightly sandy, white to reddish-brown; contains cemented zones	15	110
Siltstone, reddish-brown, to sandstone, fine to coarse	10	120
Clay, light-brown to buff	1	121
Sand, medium to very coarse; contains some calcareous nodules	9	130
Sand, fine to coarse, pink to tan; contains calcareous nodules	30	160
Sand, fine to very coarse, brown to pinkish-tan	10	170
Sand, fine to very coarse; contains calcareous layers	15	185
Silt, slightly clayey, tan to light-brown; contains hard calcareous layers	15	200
Brule formation:		
Clay, slightly silty, blocky, greenish-brown	20	220
Clay, slightly silty, blocky, brown	15	235
Clay, slightly silty, blocky, reddish-brown	5	240

B12-42-24bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,537 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, slightly sandy, light reddish-brown	2.5	2.5
Sand, fine to very coarse, very fine to medium gravel, and some pebbles, brown to pink to tan	37.5	40
Sand, fine to very coarse; contains some gravel; pink to tan; contains calcareous nodules	7.5	47.5
Ogallala formation:		
Clay, pale olive-green	2.5	50
Clay, silty, pale olive-green	2.5	52.5
Silt, clayey, light reddish-brown	3.5	56
Silt, slightly clayey and sandy, reddish-white to brown	4	60
Silt, slightly clayey, light-brown to tan; contains calcareous nodules	10	70
Silt, slightly clayey, red to tan to brown	5	75
Silt, slightly clayey, light olive-green; contains caliche	7.5	82.5
Silt, brown	2.5	85
Silt, brown; contains calcareous nodules	5	90
Silt, slightly sandy, tan to buff; contains calcareous nodules	3.5	93.5
Clay, slightly sandy and silty, light reddish-brown	20.5	114
Sand, fine to very coarse, and fine to medium gravel, brown to tan	9	123
Sand, very fine, very slightly silty, tan to buff	9	132
Sand, very fine to very coarse, brown to pink to tan; contains calcareous nodules	8	140
Sand, fine to very coarse, and fine to medium gravel, brown to pink to tan	18.5	158.5
Clay, silty, light-tan to buff	1.5	160
Silt, sandy, tan to light-brown; contains caliche	30	190
Sand, fine, and silt; calcareous, white to gray	20	210
Brule formation:		
Clay, sandy, silty, blocky, reddish-brown	20	230

B12-43-19aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,494 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay, brown to black	2.5	2.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-43-19aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Silt, slightly clayey, dark-brown	2.5	5
Silt, slightly sandy, tan to light-brown	4	9
Sand, very fine to coarse, and very fine to medium gravel, pink to tan; contains weathered calcareous nodules	11	20
Silt, slightly sandy, tan to buff	15	35
Silt; contains very fine sand and calcareous nodules; white to tan	9.5	44.5
Sand, very fine to coarse, and gravel, interbedded with silt, brown to pink to tan	5.5	50
Sand, very fine to very coarse; contains some fine gravel; brown to pink to tan	20	70
Sand, very fine to very coarse; contains some gravel; calcareous cementation	20	90
Sand, very fine to very coarse, and very fine to medium gravel; brown to pink to tan	10	100
Sand, very fine to very coarse, and very fine to medium gravel, brown to pink to tan; contains caliche	35	135
Brule formation:		
Clay, slightly silty, light-brown	5	140
Clay, slightly silty, blocky, dark-brown	10	150

B12-43-21bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,462 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, silty, and road fill	2	2
Silt, interbedded with gravel, dark-brown	8	10
Silt, interbedded with gravel, dark-brown; contains calcareous nodules	10	20
Sand, fine to very coarse; contains trace of gravel and pebbles; brown to tan	10	30
Sand and gravel, brown to pink to tan	10	40
Sand, very fine to very coarse, trace of gravel, brown to pink to tan	8	48
Brule formation:		
Clay, silty, light-tan to buff	2	50
Clay, silty, light-brown to red	20	70

B12-43-22bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,441 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, slightly sandy, brown to black	1	1
Silt, sandy, gray to brown	1.5	2.5
Sand, fine to coarse; contains trace of gravel; pink to tan	2.5	5
Sand and gravel; brown to pink to tan	25	30
Sand, very fine to very coarse; contains trace of gravel; brown to pink to tan	20	50

B12-43-23ba

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,448 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, silty, brown to black	3	3
Sand, very fine to very coarse; contains gravel; brown to pink to tan	7	10
Silt, brown to black, interbedded with pink to yellow gravel	9	19
Sand, very fine to coarse, brown to pink to tan	11	30

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-43-23ba—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, very fine to very coarse, and fine to very coarse gravel; contains pebbles; brown to pink to tan	10	40
Sand, very fine to very coarse; contains trace of gravel; brown to pink to tan	10	50
Sand, very fine to very coarse, and very fine to medium gravel, yellow to pink to tan	5	55
Sand, very fine to coarse; contains some gravel; pink to tan	35	90
Sand, very fine to very coarse, and very fine to very coarse gravel; contains pebbles; brown to pink to tan	95	185
Brule formation:		
Clay, slightly silty, light-gray	15	200
Clay, silty, light-tan to reddish-brown	20	220

B12-43-24ab

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,450 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, slightly sandy, road fill; brown to black	1	1
Silt, black to brown	4	5
Silt, slightly sandy, brown to gray	3	8
Sand, very fine, silty, light-brown to tan	2	10
Sand, very fine to coarse, brown to pink to tan	10	20
Sand, very fine to very coarse, interbedded with silt; light-brown to tan	10	30
Sand, gravel, and pebbles; pink to tan	20	50
Sand, very fine to coarse, trace of gravel; pink to tan	4	54
Ogallala formation:		
Silt, calcareous, sandy	1	55
Silt; contains some very fine sand; buff to tan	5	60
Silt, slightly sandy, interbedded with caliche, light-brown	5.5	65.5
Silt, slightly sandy; contains calcareous nodules; light-brown to red	34.5	100
Brule formation:		
Clay, slightly silty, blocky, light reddish-brown	20	120

B12-44-24aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,518 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, brown to black, and road fill	1	1
Silt, clayey, slightly sandy, black to brown	5	6
Sand, very fine to very coarse; contains trace of gravel; contains weathered calcareous nodules	6	12
Sand, very fine to medium, silty, buff to tan	8	20
Silt, and very fine sand, light-brown to buff; contains calcareous zones	12.5	32.5
Silt; contains very fine sand; tan to light-brown	7.5	40
Silt, brown to light-brown; contains calcareous zones	5	45
Silt; contains very fine sand; brown to light-brown	5	50
Silt, calcareous, slightly sandy, gray to white	10	60
Sand, very fine to very coarse; contains some gravel; brown to pink to tan	14	74
Silt, slightly clayey and sandy, buff	2	76
Sand, very fine to very coarse; contains fine to medium gravel; brown to pink to tan	2	78
Silt, slightly clayey and sandy, buff	2	80
Clay, slightly sandy and silty, gray to brown	20	100
Sand, very fine to medium, and fine gravel	10	110
Ogallala formation:		
Sand, very fine; contains fragments of clay	10	120

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B12-44-24aa—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Silt; contains some very fine to very coarse sand; buff to gray to white	50	170
Sand, fine to medium, interbedded with siltstone; light-brown; contains calcareous nodules	36	206
Silt, slightly sandy, light-brown	4	210
Brule formation:		
Clay, slightly silty, red	5	215
Clay, slightly silty, blocky	15	230

B12-44-24bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,551 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt, slightly sandy, and road fill	2.5	2.5
Silt, brown, tan	3	5.5
Sand, very fine to coarse, brown to pink to tan; contains calcareous nodules	4.5	10
Sand, very fine, silty, buff to tan	4.5	14.5
Silt, slightly sandy, light-brown to buff	2.5	17
Silt, slightly sandy, very calcareous	3	20
Sand, fine to very coarse; contains gravel; pink to tan	10	30
Brule formation:		
Clay, silty, blocky, red to brown	20	50
Clay, slightly sandy and silty, brown to reddish-brown	10	60
Clay, slightly silty, green to light-brown	2.5	62.5
Clay, slightly silty, red to brown	7.5	70

B13-41-31bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,366 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt, sandy, dark-brown to black	0.5	0.5
Sand, fine to medium, brown to pink to tan	.5	1
Silt, slightly clayey, black	2	3
Sand, fine to coarse, brown to pink to tan	2	5
Sand, fine to coarse; contains pebbles and coarse gravel; brown to pink to tan	5	10
Sand and gravel, brown to pink to tan	5	15
Gravel, fine to coarse, interbedded with silt; brown	5	20
Ogallala formation:		
Silt, sandy, light-brown; contains caliche	15	35
Brule formation:		
Clay, slightly sandy and silty, blocky, reddish-brown	35	70

B13-42-25aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,471 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, silty, sandy, light-tan to brown	0.5	0.5
Sand, medium to very coarse; contains some gravel	5	5.5
Silt, slightly sandy, brown to buff	2.5	8
Sand, medium to coarse, clayey, red to brown	2	10
Sand, fine to coarse, brown to pink to tan	11	21
Silt, slightly sandy, gray to brown	7.5	28.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

DEUEL COUNTY, NEBR.—Continued

B13-42-25aa—Continued

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated—Continued		
Sand, fine to very coarse; contains some fine gravel; light-tan; contains blocky clay	6	34.5
Silt, clayey, gray to brown to green	7	41.5
Sand and gravel, pink to tan to gray to black	13	54.5
Ogallala formation:		
Silt, slightly clayey, pink to brown	3	57.5
Silt, slightly sandy, light-brown; contains calcareous zones	2.5	60
Silt, very sandy, light-brown to buff	10	70
Sand, very fine to coarse, brown to pink to tan	6.5	76.5
Silt, slightly sandy, brown to buff	3.5	80
Sand, fine to coarse	4.5	84.5
Sand, medium to very coarse; contains fine gravel; brown to tan	5.5	90
Sand, interbedded with silt and calcareous zones, light-tan to gray	10	100
Silt, slightly sandy, gray to white	4.5	104.5
Caliche, slightly sandy	2	106.5
Silt, very slightly sandy, olive-green; contains caliche	18.5	125
Silt, slightly clayey and sandy, light-brown; contains calcareous zones	5	130
Silt, slightly sandy, gray to white to green; contains caliche	20	150
Brule formation:		
Clay, slightly silty, red to brown	40	190
Clay, slightly sandy and silty, red to brown	63	253
Silt, slightly sandy, light-brown	27	280

KEITH COUNTY, NEBR.

B12-36-5bb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,322 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, slightly sandy and silty, grayish-brown	0.5	0.5
Silt, clayey, gray	3	3.5
Ogallala formation:		
Silt; contains calcareous nodules; grayish-white	5	8.5
Silt; contains very fine to fine sand, and calcareous nodules; light-brown to tan	12.5	21
Silt, sandy, clayey, grayish-white	5	26
Sandstone, very fine to fine-grained, silty, slightly clayey, brown to white; contains white calcareous nodules	11	37
Silt, calcareous; contains very fine to fine sand; white	3	40
Silt, calcareous; contains very fine to fine sand, reddish-brown	6	46
Sand, very fine to coarse, silty, red to gray; contains white calcareous nodules	17.5	63.5
Sand, medium to very coarse, pink to tan	2.5	66
Silt, sandy, grayish-tan	10.5	76.5
Sand, very fine to coarse, pinkish-tan	9.5	86
Silt; contains very fine to medium sand, and caliche; grayish-white to brownish-white	19.5	105.5
Sand, very fine to very coarse, pinkish-tan	19.5	125
Sand, very fine to very coarse, pinkish-tan; contains fine gravel	5	130
Sand, silty, very fine to medium, red to brown	24	154
Sand, very fine to very coarse, brown to pink to tan	31	185
Silt, sandy, gray to brown to white	11	196
Sand, fine to very coarse, cemented with calcareous material	4	200
Sandstone, very fine grained to medium-grained, light-tan	5	205
Sandstone, calcareous, silty, grayish-white	2.5	207.5
Clay, red to brown; contains calcareous zones	2.5	210
Sandstone, very fine grained to fine-grained, silty; contains caliche; reddish-brown	45	255
Sand, very fine to medium; contains some coarse sand (red to brown), and white calcareous layers	15	270

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B12-36-5bb—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Sand, very fine to very coarse; red to brown	10	280
Sand, very fine to very coarse; contains fine gravel; pink to tan	10	290
Sand, very fine to coarse, pink to brown to tan	10	300
Sand, very fine to medium, and siltstone; light-tan to brown	10	310
Sand, very fine to coarse; contains calcareous zones; dark- to reddish-brown	90	400
Silt; contains very fine sand; reddish-brown	3	403
Clay, slightly silty, reddish-brown	7	410
Sandstone, slightly clayey, slightly silty, reddish-brown	10	420
Sandstone, slightly clayey, slightly silty; contains calcareous nodules; reddish-brown	10	430
Brule formation:		
Clay, slightly silty, blocky; contains calcareous zones; red to brown	20	450

B12-36-18dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,313 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, slightly sandy and silty, black	3	3
Ogallala formation:		
Silt, slightly sandy and clayey, brown, gray to black	7	10
Clay, slightly silty, gray to olive-green	5	15
Silt, slightly clayey and sandy; contains calcareous nodules; brick-red	5	20
Silt to very fine sand, calcareous, grayish-white	1	21
Silt to very fine sand, gray to red	4	25
Silt to very fine sand, calcareous, grayish-white	1	26
Silt to very fine sand, gray to red to green; contains zones of caliche	14	40
Sand, very fine to medium, silty, calcareous, gray to white	5	45
Sand, very fine to fine, reddish-tan	5	50
Sand, very fine to medium, silty, reddish-tan; contains calcareous layers	7.5	57.5
Sand, very fine to coarse, brownish-tan	12.5	70
Sand and fine to medium gravel; pink to tan	33.5	103.5
Silt, slightly sandy, grayish-red to brown	12.5	116
Sand, very fine to coarse, silty, calcareous, tan to green	9	125
Silt, slightly sandy, reddish light-brown; contains calcareous rootlets and zones of caliche	25	150
Sand, very fine to very coarse, brown, pink to tan	20	170
Sand, fine to coarse, and fine gravel, pink to tan	12	182
Sand, very fine to medium; contains some coarse silty slightly cemented sand and calcareous nodules	18	200
Silt, sandy, reddish-tan; contains layers of caliche	8.5	208.5
Silt to very fine sand, light-brown; contains layers of caliche	6.5	215
Sand, very fine to medium, gray to green; contains layers of caliche	8	223
Sand, very fine to very coarse, pink to tan	12	235
Sand, very fine to fine, silty, red to brown; contains layers of caliche	23	258
Sand, very fine to medium, tan to light-brown	2	260
Sand, very fine to coarse, pinkish-tan	10	270
Sand, fine to very coarse, slightly silty; contains reworked clay; tan	10	280
Silt, sandy, grayish-tan	4	284
Sand, very fine to very coarse, pinkish-tan	6	290
Silt, sandy, gray to white; contains layers of caliche	5	295
Sand, very fine to medium, tan to light-brown	5	300
Sand, very fine to coarse, brown to tan	10	310
Sand, very fine to coarse, silty, tan to light-brown	50	360
Silt, slightly sandy, gray to white	3	363
Sand, very fine to medium, tan to light-gray	22	385
Silt, sandy, grayish-white	5	390
Silt, slightly sandy, calcareous, grayish-white	5	395
Silt, sandy, slightly clayey, grayish-white to green	5	400

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B12-36-18dd—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Siltstone, very slightly sandy, brown to olive-green; contains layers of caliche	10	410
Clay, silty, red to brown	20	430
Siltstone, slightly clayey, gray to olive-green	25	455
Clay, green	25	480

B12-39-2dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,455 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, slightly clayey, very dark-brown to gray	3	3
Ogallala formation:		
Silt, very fine sand; buff to gray with yellow tinge	6.5	9.5
Sandstone, very fine grained to fine-grained; contains some coarse grains, silty, buff to gray; contains calcareous rootlets	18	27.5
Clay, silty, slightly sandy, red to tan	10	37.5
Sand, very fine to coarse, light-brown to pink to tan	2.5	40
Sand, medium to very coarse, and fine gravel; brown to pink to tan	10	50
Sand, very fine to very coarse, and silty, pink to tan to red, brown, and gray	10	60
Sand, very coarse, and fine gravel, brown to gray	10	70
Gravel, medium, and sand, brown to gray	9	79
Clay, very slightly sandy and silty, light-buff to gray	1.5	80.5
Silt, clayey, slightly sandy, red to tan to gray	16.5	97
Silt, slightly clayey and sandy, light olive-green to gray	3	100
Silt, slightly clayey; contains very coarse sand and thin zones of caliche; tan	10	110
Silt, marly, sandy, white to gray	2.5	112.5
Silt; contains fine to coarse sand; brown to tan	2	114.5
Sand, fine to very coarse; contains some fine gravel; brown, gray and pink	3.5	118
Silt; contains fine to coarse sand, clayey, tan	10	128
Sand, fine to very coarse, light-brown to pink to tan	2	130
Silt, slightly sandy and clayey, light olive-green	9.5	139.5
Silt, calcareous, slightly clayey, tan to gray	.5	140
Silt, clayey, slightly sandy, tan to gray	10	150
Marl, very fine sand, and silt, tan to gray	4.5	154.5
Silt, clayey, slightly sandy, gray to white and olive-green	3.5	158
Silt, clayey, slightly sandy, light-brown	2	160
Silt, slightly sandy and clayey, red to tan	13	173
Sand, very fine to medium; contains trace of coarse sand; brown to tan	2	175
Sandstone, very fine grained to fine-grained; contains trace of medium sandstone; gray to green	35	210
Silt, slightly clayey; contains very fine to fine sand; light-gray to green	10	220
Sand, very fine to very coarse, silty, gray to tan	5	225
Sand, fine to very coarse, and fine gravel; light-brown to pink to tan	42.5	267.5
Silt, clayey, tan to gray to white	7.5	275
Sand, fine to medium, silty, clacareous, white to gray	10	285
Sand, very fine to medium, and silt, tan to gray	30	315
Marl, clayey, slightly silty, green to white	7	322
Silt, clayey, slightly sandy, light olive-green	4	326
Marl, slightly sandy and clayey, gray to white	4	330
Sand, very fine to coarse, pink to tan	55	385
Silt; contains very fine sand and clay; tan to brown to gray	15	400

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B12-40-8dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,531 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Road fill, clayey, silty, dark-brown	0.5	0.5
Sand and silt, brown	2.5	3
Sand, fine to very coarse; contains silt; gray to white	1.5	4.5
Sand, very fine to very coarse, brown to pink to tan	5.5	10
Sand, very fine to coarse, and medium gravel, brown to pink to tan	8	18
Ogallala formation:		
Sandstone, fine-grained, slightly silty, buff to brown	2	20
Silt, slightly clayey and sandy, red to brown to light-tan	6	26
Sand, fine to medium, and fine gravel	4	30
Sand, fine to very coarse; contains medium gravel and interbedded layers of silt; tan	21.5	51.5
Silt, sandy, red to light-brown	8.5	60
Sand, fine to medium, and fine gravel; brown to pink to tan	8	68
Silt, sandy, light reddish-brown	4.5	72.5
Sand, fine to medium, and fine to medium gravel, tan to brown	2.5	75
Silt, sandy, light reddish-brown	1	76
Sand, fine to medium, and fine to medium gravel, brown to tan	4	80
Silt, sandy, gray to red to brown	2.5	82.5
Sand, very fine to medium, brown to pink to tan	2.5	85
Silt, sandy, reddish-brown	19	104
Sand, fine to very coarse, and very fine to very coarse gravel, brown to pink to tan	6.8	110.8
Silt, sandy, light-brown to tan	1.7	112.5
Sand, fine to very coarse, and very fine to very coarse gravel, brown to pink to tan	10	122.5
Silt, slightly sandy, gray to reddish-brown	22.5	145
Sand, very fine to very coarse, brown to pink to tan	31	176
Silt, slightly clayey, light-brown to tan	4	180
Silt, slightly clayey and slightly sandy, light-brown to tan; contains layers of caliche	20	200
Sand, very fine to very coarse, brown to pink to tan	33.5	233.5
Silt, sandy, brown to tan; contains calcareous nodules	6.5	240
Sand, very fine to very coarse, slightly silty, brown to pink to tan	10	250
Sand, very fine to very coarse; contains very fine gravel; brown to pink to tan	30	280
Silt; contains very fine to very coarse sand; brown, yellow, and pink	10	290
Silt, calcareous; contains caliche; red to brown	10	300
Silt, slightly sandy, gray to white; contains reddish-brown clay	10	310
Silt, sandy, white to brown	5	315
Sand, fine to coarse, yellow to pink to tan	5	320
Sand, slightly silty, calcareous, green to white	15	335
Silt, sandy, gray to white to brown	10	345
Sand, very fine to coarse, brown to pink to tan	16.5	361.5
Silt, slightly sandy, reddish-brown	8.5	370
Brule formation:		
Clay, silty, reddish-brown	5	375
Sand, fine to coarse	10	385
Silt, sandy, white to gray	5	390

B12-41-2bc

[Driller's log of irrigation well drilled by Haggard Drilling Co., 1947. Surface altitude, 3,389 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	2	2
Clay	10	12
Sand and gravel	4	16
Sand and gravel; contains silt	38	54

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B12-41-2bc—Continued

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated—Continued		
Sand and caliche	50	104
Gravel	10	114
Gravel and caliche	5	119
Sand and gravel	7	126
Clay	2	128
Sand and gravel	23	151

B12-41-2bd

[Driller's log of irrigation well drilled by Haggard Drilling Co. Surface altitude, 3,391 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	4	4
Sand and gravel	50	54
Gravel, coarse	3	57
Sandstone and caliche	53	110
Gravel	9	119
Clay, sandy	3	122
Gravel	3	125
Clay and caliche	6	131
Gravel	17	148
Brule formation(?):		
Clay	1	149

B12-41-3db

[Driller's log of test hole drilled by Haggard Drilling Co. Surface altitude, 3,390 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil, sandy	6	6
Sand and gravel	30	36
Sand, cemented; contains silt	8	44
Clay	8	52
Sand and gravel	4	56
Clay and caliche	26	82
Sand and gravel	2	84
Clay	22	106
Sand and gravel	9	115
Clay and caliche	12	127
Sand and gravel	29	156
Caliche	10	166

B12-41-6dc2

[Driller's log of test hole drilled by Haggard Drilling Co., 1948. Surface altitude, 3,395 feet]

Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	2	2
Sand and silt	14	16
Gravel	28	44
Clay	25	69
Gravel	9	78
Clay	8	86
Sand and gravel	24	110
Clay and caliche	7	117

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

KEITH COUNTY, NEBR. — Continued

B12-41-7ba

[Driller's log of test hole drilled by Haggard Drilling Co., 1945. Surface altitude, 3,398 feet]

	Thickness (feet)	Depth (feet)
Pliocene, Pleistocene, and Recent deposits, undifferentiated:		
Soil	3	3
Sand	5	8
Clay	7	15
Sand and gravel; contains silt	8	23
Clay	13	36
Sand and gravel	18	54
Clay	6	60
Sand and gravel	6	66
Clay	12	78
Sand and gravel	30	108
Caliche	5	113

B13-36-5cb

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1944. Surface altitude, 3, 109 feet]

Pleistocene and Recent deposits, undifferentiated:		
Silt, clayey, calcareous, dark-gray	2	2
Sand, silty, yellow to buff	2	4
Gravel, fine to coarse, and fine to coarse sand; pinkish-gray; contains some pebbles	21	25
Ogallala formation:		
Sandstone, silty, soft, friable, light-pink to tan	22.5	47.5
Sand, fine, to coarse gravel, cemented, pink to gray	11.5	59

B13-36-8ba

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1944. Surface altitude, 3, 107 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, light-brown to gray	2	2
Sand, silty, calcareous	2	4
Sand, medium, to medium gravel, red to brown	6	10
Sand, fine, to coarse gravel, red to brown	13	23
Ogallala formation:		
Clay, silty, calcareous, red to brown to gray to white	7	30
Sand, silty, pink to tan; contains calcareous cemented layers	30	60
Sand, fine, to coarse gravel; contains calcareous cemented layers	10	70
Sand, clayey, cemented, red to brown	7	77
Sand, silty, pink to tan	13	90
Sand and fine gravel, cemented	13	103
Sand, silty, pink to tan to gray; contains calcareous cemented layers	7	110
Limestone, sandy, tan to light-gray	7	117
Sand, silty, gray to tan; contains calcareous cemented layers	73	190
Sand, cemented, micaceous	6	196
Sand, fine, and silt; green to gray to brown; contains calcareous cemented layers	63	259
Sand, fine to coarse, brown, and limestone	5	264
Brule formation:		
Clay, silty, pink to tan	7	271
Clay, silty, green to gray	6	277
Sand, fine; contains calcareous cemented layers	43	320
Limestone, clayey, white to green to gray	10	330

Logs of test holes, wells, and seismograph shot holes, in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-8bd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1944. Surface altitude, 3,110 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, very sandy, light-brown	2	2
Clay, light-tan	2	4
Gravel, medium to coarse; contains some sand	6	10
Gravel, fine to coarse, and medium to coarse sand, pink and orange	10	20
Gravel, fine to medium; contains some sand; light-orange	9.5	29.5
Ogallala formation:		
Silt and clay, cemented with calcium carbonate	3	32.5
Sand, cemented, light-brown	15	47.5
Sand, fine, and clay, brown	2.5	50
Gravel, fine to medium, orange and pink	6	56
Silt, sandy, calcareous, orange	5	61
Sand, fine, to medium gravel; red to brown	19	80
Sand, calcareous, pink	4	84
Gravel and sand, orange	6	90
Sand, silty, calcareous, tan to brown	70	160
Sand, fine, to medium gravel, orange	10.5	170.5
Clay, silty, red to brown	6.5	177
Sand, fine, to fine gravel, red to tan	29	206
Sandstone, fine-grained, red to tan	4	210
Limestone and silt, red to tan	10.5	220.5
Sand, fine to coarse, clayey, calcareous, gray to white	25.5	246
Clay, sandy, silty, and limestone	10	256
Brule formation:		
Silt, sandy, brown to tan	4	260
Sand, silty, pink to tan	8	268
Clay, silty, pink to tan	12	280

B13-36-8dc

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1944. Surface altitude, 3,108 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Soil, sandy, light-brown	2	2
Clay, sandy, brown to gray	3	5
Gravel, red to brown, and brown sand	2	7
Sand, fine, to coarse gravel	8	15
Gravel, medium, and coarse sand, red to brown	7	22
Sand, silty, brown to tan	8	30
Sand, fine, to medium gravel; red to brown	7.5	37.5
Sand, fine, silty, pink to tan	20	57.5
Sand, slightly cemented, tan	2.5	60
Sand, fine, to medium gravel, red to brown	20	80
Ogallala formation:		
Silt, sandy, brown to tan	18	98
Sand, fine, to coarse gravel, light-gray; contains cemented layers	52	150
Sand, fine to medium, brown to gray	46.5	196.5
Sand, calcareous, gray to tan	3.5	200
Silt, light-tan	5	205
Sand, calcareous, brown	44.5	249.5
Brule formation:		
Clay, silty, tan to brown	8.5	258
Silt, sandy, brown	2	260
Clay, silty, brown to tan	19	279
Clay, gray to light-gray	21	300

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-36-17dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,151 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Road fill	0.5	0.5
Soil, silty, clayey, brown to black	7.5	8
Ogallala formation:		
Silt, and very fine to medium sand, light-tan to brown	2	10
Silt, and very fine to medium sand, gray	8	18
Sand, fine to very coarse, pink to tan	7	25
Sand, silty, fine to medium; contains many gray to white calcareous nodules	5	30
Sand, fine to coarse, brown to pink to tan	5	35
Sand, medium to very coarse; contains very fine to fine gravel; gray	10	45
Clay, light olive-green to gray	5	50
Sand, medium to very coarse, pinkish-gray	5	55
Clay, sandy, silty, reddish-brown	5	60
Sandstone, very fine grained to fine-grained, silty, reddish-brown	20	80
Sandstone, very fine grained to fine-grained, silty, calcareous, gray to tan	30	110
Sand, very fine to medium, silty, calcareous, brown to tan	10	120
Sand, very fine to very coarse, brown to pink to tan; contains caliche	50	170
Sand, very fine to medium, silty, calcareous, gray to brown; contains fragments of red to brown clay	20	190
Sand, silty, green to white to brown	12	202
Silt, sandy, clayey, reddish-brown	18	220
Sand, fine to very coarse, calcareous; contains very fine gravel; pink to tan	10	230
Sand, very fine to medium, silty; contains some fragments of clay; green to brown	20	250
Brule formation:		
Silt, clayey, blocky, brownish-red	23	273
Sand, clayey, slightly silty, brown to reddish-tan; contains calcareous nodules	22	295
Clay, slightly silty, blocky, reddish-brown	15	310
Clay, silty, greenish-gray	20	330

B13-38-6ab

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,231 feet]

Pleistocene and Recent deposits, undifferentiated:		
Sand, gravel, and silt, brown to gray	5	5
Silt, loamy; contains sand and gravel, brown to buff	11.5	16.5
Silt, very fine sand, and clay, dark-brown to gray	1.5	18
Silt; contains very fine to fine sand, and clay; buff to gray to brown	12	30
Silt, and very fine sand; buff to gray to yellow	2	32
Sand, fine to coarse, and very fine gravel; brown	9.5	41.5
Ogallala formation:		
Sandstone, calcareous, silty, dark-gray	8.5	50
Sandstone, fine- to medium-grained, calcareous, light-tan	10	60
Sand, fine to coarse; contains fine to medium gravel; brown to gray	50	110
Sand, very fine to medium, light-brown	6	116
Brule formation(?):		
Silt, clayey, white to gray to green	4	120

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-38-6dc

[Sample log of test hole drilled by Conservation and Survey Division cf the University of Nebraska, 1949. Surface altitude, 3,214 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, silty, sandy; contains fine gravel; light- to dark-gray	4.5	4.5
Sand, medium to coarse; contains fine to medium gravel; light-brown to pink to tan	18.5	23
Sand, fine to very coarse; contains some fine to medium gravel; yellow to light-tan	4	27
Ogallala formation:		
Sandstone, very fine grained; contains some caliche; light-gray to tan	22.5	49.5
Sand, silty, slightly cemented, brown to tan	10.5	60
Sandstone, fine- to medium-grained, calcareous, white to gray	4.5	64.5
Sand, silty, light-gray to green	2.5	67
Sandstone, very fine grained to medium-grained; contains some coarse-grained sandstone; light-brown to gray	22	89
Silt, sandy, clayey, interbedded with very fine grained sandstone, green to brown	7	96
Sandstone, very fine- to medium-grained, light-brown; contains caliche	29.5	125.5
Sand and soft sandstone, tan to light-brown	4.5	130
Sand, very fine to medium; contains some coarse silty sand; tan to light-brown	20	150
Sand, silty, light-tan, interbedded with caliche	8	158
Silt, clayey, light-tan	8	166
Sand, very fine, silty, light-brown	4	170
Sand, fine to very coarse, pink to tan	16	186
Silt, clayey, clacareous, brown to tan	10	196
Sand, fine to very coarse; contains very fine to fine gravel; pink to tan	10	206
Brule formation:		
Clay, silty, brown to pink to tan	6	212
Clay, pale-green	9.5	221.5
Clay, medium-gray	9.3	230.8
Siltstone, siliceous, light-gray	.7	231.5

B13-38-7db

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,211 feet]

Pleistocene and Recent deposits, undifferentiated:		
Loam, clayey, and silt, dark-brown to black	2	2
Silt, light-buff to gray	1.5	3.5
Sand, fine, silty; contains medium gravel; yellow	3	6.5
Sand, medium, and fine to medium gravel; pink to gray	15.5	22
Silt, sandy, light-tan to brown	1.5	23.5
Sand; contains fine to medium gravel	3.5	27
Ogallala formation:		
Silt; contains very fine to fine sand, and clay; tan to light-gray	8	35
Sand, very fine to fine; contains silt; brown	3.5	38.5
Silt, calcareous, slightly sandy, white to gray	2	40.5
Sand, very fine to fine, and silt, brown to gray; contains caliche layers and calcareous rootlets	3.5	44
Sandstone, very fine grained to fine-grained, calcareous, gray to white	12	56
Sandstone, fine- to medium-grained, interbedded with caliche and calcareous rootlets, green to brown	14	70
Sand, very fine to medium, slightly cemented with calcium carbonate, gray to brown	20	90
Sand, very fine to medium, light-tan	3	93
Sand, very fine to medium, and silt; tan to gray to brown; contains fragments of green clay	5.5	98.5
Sandstone, very fine grained to fine-grained, calcareous, white to gray	1	99.5
Sand, very fine to fine, tan to brown	10.5	110

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

KEITH COUNTY, NEBR.—Continued

B13-38-7db—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Sand, calcareous, fine to coarse, silty, gray to tan	11.5	121.5
Sandstone, fine- to medium-grained, silty, gray to white	8.5	130

B13-38-18ab

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,241 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Loam, sandy, very light-brown	0.5	0.5
Silt, sandy, very fine to very coarse, light-brown	6.5	7
Sand, medium to very coarse; contains clayey silt; gray to brown to pink.	13	20
Sand, medium, and medium to coarse gravel, brown to gray to pink	9	29
Silt; contains medium sand; dark-brown and gray to light-yellow	2	31
Sand, coarse, and coarse gravel, light-pink to gray	9	40
Silt, sandy, pink to tan; contains yellow to brown iron stain	2	42
Gravel, very coarse, and coarse sand, pink to tan	13	55
Sand and silt; contains fine gravel and caliche; pink to gray	15	70
Ogallala formation:		
Sandstone, very fine grained to medium-grained, light-gray to yellow to brown; contains caliche and calcareous rootlets; contains some silt and very coarse sand	45	115
Sand, very fine to medium, and silt; light-tan to gray	5	120
Sandstone, very fine grained to medium-grained; contains some coarse sandstone; very light-tan to gray	18.5	138.5
Sand, fine to medium; contains some coarse sand, silty; gray to white to olive	1.5	140
Silt; contains very fine to medium sand; light-olive to gray; contains caliche	17	157
Sand, medium to very coarse, and fine gravel; contains silt; pink to tan to gray	8	165
Silt, clayey to sandy, pink to tan to gray	18	183
Silt; contains very fine sand; dark-brown to tan	11	194
Sand, medium to very coarse; contains some fine gravel; brown to gray with pink and green	6	200
Silt, clayey and sandy, very light greenish-gray	16	216
Caliche, sandy, white	1.3	217.3
Sand, fine to very coarse, brown to gray, with pink and green	2.7	220
Silt, clayey, light-green to gray	4	224
Sand, fine to very coarse, brown to gray, with pink and green	14	238
Clay, light-green	5	243
Sand, fine to medium	3.5	246.5
Clay, light-green, interbedded with siltstone	7.2	253.7
Siltstone, siliceous	.3	254

B13-38-30ba

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,398 feet]

Pleistocene and Recent deposits, undifferentiated:		
Clay and fine to medium sand, loamy, light-brown	1.5	1.5
Silt and very fine to medium sand, gray to white	1	2.5
Ogallala formation:		
Sand, very fine to coarse, gray to pink to tan	7.5	10
Sand, fine to very coarse, and fine to medium gravel, pink to tan	19	29
Silt; contains fine to coarse sand; pink to tan	2	31
Sand, medium, and coarse gravel, brown to pink to gray	8.5	39.5
Clay, silty, tan to gray	13.5	53
Sand, very fine to coarse, brown to tan to gray	7	60
Silt, clayey to slightly sandy, calcareous, brown to tan to gray	29.5	89.5

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-38-30ba—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Sand, medium, and fine gravel, brown to pink to gray	10	99.5
Silt, clayey to sandy, light-brown to tan	17	116.5
Sand, very fine to very coarse, and fine gravel, brown to pink to gray	4	120.5
Sandstone, fine- to coarse-grained, silty, calcareous, gray to white	1.5	122
Silt; contains fine to coarse sand; light-buff to gray; contains calcareous nodules	8	130
Sandstone, brown to gray; contains calcareous cement	4	134
Sand, fine, to very coarse, brown to gray	3.5	137.5
Silt, clayey and sandy, light-green to gray	33	170.5
Sand, fine to very coarse, and fine gravel; brown to pink to gray	4	174.5
Silt, slightly clayey and sandy, tan to gray to reddish-tan	5.5	180
Sand, very fine to coarse; contains silt; brown to tan	15	195
Sand, fine to coarse, and caliche	26.5	221.5
Silt, sandy, pink to tan	2.5	224
Caliche, sandy, gray; contains some volcanic ash	2	226
Sandstone, fine- to medium-grained; contains some coarse sandstone; brown to gray	7	233
Sandstone, fine- to medium-grained; contains silt; light-tan to gray	7	240
Sand, very fine to coarse, pink to tan to brown	20	260
Sand, very fine to medium, silty, gray to white	10	270
Sandstone, calcareous, very fine- to coarse-grained, gray to white to green	30	300
Sandstone, very fine grained to medium-grained, silty, light-brown to tan; contains caliche	30	330
Sand, very fine to medium, light-tan to brown	3	333
Sandstone, very fine to medium grained, slightly silty, light-brown to green	2	335
Siltstone, slightly clayey and calcareous, white to gray	5	340
Brule formation:		
Silt, clayey, slightly sandy, light-gray to brown	50	390

B13-40-16aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,336 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Clay, slightly sandy and silt, light-brown	0.5	0.5
Silt, very slightly clayey, gray to black	5.5	6
Sand, very fine to coarse, slightly silty, pink to tan	4	10
Gravel, fine to medium, brown to pink to tan	3	13
Silt, brown to black	17	30
Silt, buff to light-brown	7	37
Sand, very fine to fine, brown to pink to tan	3	40
Sand, fine to very coarse, and very fine to coarse gravel, interbedded with caliche	16.5	56.5
Silt, slightly sandy, gray to white	8	64.5
Sand, very fine to medium; contains caliche; brown to pink to tan	5.5	70
Sand, fine to very coarse, and coarse gravel, yellow to pink to tan; contains caliche	10	80
Sand, medium to very coarse, and medium gravel, yellow to pink to tan, and caliche	10	90
Sand, very fine to very coarse, brown to pink to tan	12.5	102.5
Ogallala formation:		
Silt, sandy, gray to white	17.5	120

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-40-16dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,300 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Silt, slightly sandy, tan	1.5	1.5
Silt, and very fine to medium sand, gray to brown	2.5	4
Clay, silty, black	1	5
Silt, buff to tan	5	10
Sand, very fine to very coarse; contains trace of gravel; brown to pink to tan	26.5	36.5
Silt, sandy, buff to tan	3.5	40
Sand, very fine to very coarse	10	50
Sand, very fine to very coarse; contains calcareous rootlets; brown to pink to tan	40	90
Sand, very fine to medium, brown to pink to tan	30	120

B13-40-28aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,298 feet]

Pleistocene and Recent deposits, undifferentiated:		
Road fill, and sandy silt; brown	1	1
Sand, fine to very coarse; contains some gravel, brown to pink to tan	19	20
Sand, very fine to medium, and fine to medium gravel, brown to pink to tan	10	30
Ogallala formation:		
Clay, reddish-tan; contains calcareous fragments	3.5	33.5
Caliche, slightly sandy, gray to white	2.5	36
Silt, slightly sandy, brown to buff	4	40
Silt, slightly sandy, brown to buff; contains calcareous fragments	5	45
Sand, very fine to very coarse; contains calcareous nodules; brown to pink to tan	13.5	58.5
Caliche	1.5	60
Silt, slightly sandy; contains calcareous zones; light-brown	7	67
Silt, slightly sandy, light-brown	13	80
Sand, very fine to coarse, and silt, brown to gray; contains calcareous zones	10	90
Sand and gravel, brown to pink to tan	10	100

B13-40-28dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,303 feet]

Pleistocene and Recent deposits, undifferentiated:		
Road fill	2.5	2.5
Silt, dark-brown	4.5	7
Sand, fine to very coarse, brown to pink to tan	3	10
Sand, fine to very coarse, and gravel, brown to pink to tan	10	20
Sand and fine to coarse gravel, pink to tan	11.5	31.5
Silt, tan to gray	11.5	43
Sand, very fine to medium, brown to pink to tan	17	60
Sand, fine to coarse, and fine to medium gravel, brown to pink to tan	60	120
Sand, very fine to very coarse, brown to pink to tan	10	130
Sand and gravel, brown to pink to tan	10	140
Sand, very fine to very coarse	10	150
Sand and gravel, pink to tan; contains calcareous nodules	10	160
Sand, very fine to very coarse, gray to brown	10	170

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Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B13-40-34bc

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,340 feet]

	Thickness (feet)	Depth (feet)
Pleistocene and Recent deposits, undifferentiated:		
Road fill and sandy silt, brown	5	5
Silt, and very fine to medium sand, light-brown	5	10
Sand, very fine to very coarse, interbedded with silt, brown to tan	10	20
Sand, very fine to medium, and gravel, interbedded with silt, brown to tan	16	36
Sand, fine to very coarse, brown to pink to tan; contains calcareous nodules	4	40
Sand and gravel, brown to pink to tan; contains calcareous rootlets	30	70
Sand, fine to very coarse, brown to pink to tan; contains calcareous rootlets	10	80
Sand and gravel, pink to tan; contains caliche	10	90
Ogallala formation:		
Sand, very fine to very coarse; contains trace of gravel; brown to pink to tan	4	94
Silt, slightly sandy	5	99
Silt, slightly sandy, very calcareous, white to gray	11	110
Sandstone, very fine grained, light-gray to brown; contains calcareous nodules	7.5	117.5
Silt, slightly sandy, gray to white; contains caliche	7.5	125
Sand, fine to coarse, brown to pink to tan	9.5	134.5
Silt, slightly sandy, gray to white	3	137.5
Sand, fine to coarse, brown to pink to tan	1.5	139
Silt, slightly sandy, gray to white	1	140
Sand, fine to very coarse; contains gravel; brown to pink to tan	20	160
Sand, fine to very coarse, brown to pink to tan	34	194
Silt, sandy, light-brown to buff	1	195
Sand, fine to medium, brown to pink to tan	5	200
Silt, clayey, brown	8	208
Silt, sandy, light-brown to tan	2	210
Silt, slightly sandy, white	1	211
Brule formation:		
Silt, clayey, light-brown	4	215
Clay, silty, blocky, reddish-brown	7.5	222.5
Sand, fine to medium, brown to tan	3.5	226
Silt, slightly sandy, white to gray to tan	4	230
Silt, slightly clayey to slightly sandy; contains volcanic ash; olive-green	15	245
Silt, slightly clayey, green to tan	5	250

B14-36-31ba

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,303 feet]

Pleistocene and Recent deposits, undifferentiated:		
Soil and fine sand, silty, gray to black	3	3
Ogallala formation:		
Silt, clayey, tan to brown	4.5	7.5
Sand, very fine to medium, silty, pink to tan	2.5	10
Sand, very fine to medium, silty, pink to tan; contains calcareous nodules	10	20
Sand, very fine to coarse, pink to tan	5	25
Sand, very fine to very coarse, and fine to medium gravel, pink to tan	10.5	35.5
Silt, clayey; contains some very fine sand; light-brown to tan	6.5	42
Sand, very fine to very coarse, and fine gravel, pink to tan	8	50
Sand, medium to very coarse, and fine to medium gravel; pink to gray	15	65
Sand, coarse, and coarse gravel, pink to gray; contains yellow iron stain	15	80
Sand, fine to very coarse, and fine to medium gravel, pink to gray	28.5	108.5
Silt, clayey; contains fine to medium sand; pink to tan	1.5	110

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

KEITH COUNTY, NEBR. —Continued

B14-36-31ba—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Clay, silty to slightly sandy, pink to tan to gray	8	118
Caliche, sandy, silty, slightly clayey, gray to white	2	120
Sandstone, calcareous, silty, gray to white	10	130
Sand, silty, gray to tan	5	135
Sand, very fine to medium, silty, gray to tan; contains caliche	19.5	154.5
Silt, sandy, very fine to medium, pink to brown	.5	155
Caliche, slightly sandy and silty, gray to white	1	156
Sand, very fine to very coarse, silty, calcareous, gray to white; contains caliche	74	230
Sandstone, very fine grained to medium-grained, silty, calcareous, gray to white	2	232
Sand, fine to very coarse, very calcareous, pink to tan	48	280
Sandstone, very fine grained to medium-grained, gray to brown; contains calcareous rootlets and caliche	4	284
Sand, very fine to medium, brown to gray; contains some silt	76	360
Sandstone, very fine grained to fine-grained, calcareous, silty, gray to white; contains caliche	17	377
Silt, sandy, calcareous, gray to white	1.5	378.5
Sand, very fine to medium, light-brown to tan; contains caliche	7.5	386
Brule formation:		
Siltstone, clayey, granular, brown to tan	44	430

B14-38-19ab

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,459 feet]

Ogallala formation:		
Sand, very fine to fine, very silty, brown to gray	62	62
Sand, fine, and fine gravel, brown to gray	2	64
Clay, very tough, slightly silty, and sand; gray to tan	12.5	76.5
Gravel, fine to medium, and coarse sand; pink to gray	23.5	100
Silt, clayey and sandy, pink to tan	28.5	128.5
Clay, silty, calcareous, gray; contains calcareous nodules	1.5	130
Silt, clayey and slightly sandy, white to gray	8.5	138.5
Silt, and fine to very coarse sand; tan; contains calcareous nodules	56.3	194.8
Sand, fine to coarse, brown to tan	2.2	197
Silt, sandy, light-brown to gray	1.5	198.5
Sand, fine to medium, and medium gravel, tan	20.5	219
Silt, very sandy, brown to gray	11	230
Sand, very fine to coarse, and fine gravel, silty, brown to gray	41.5	271.5
Silt, slightly sandy, brown to gray to white	48.5	320
Sand, fine to medium, and siltstone, olive to gray	15	335
Sand, very silty, tan to gray	49.5	384.5
Silt, clayey, brown to tan	1.5	386
Sand, silty, brown to pink	19.5	405.5
Brule formation:		
Clay and siltstone, brown to pink to tan, becoming reddish	44.5	450

B14-38-30dc

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,380 feet]

Ogallala formation:		
Silt, sandy; contains fine gravel; buff to gray	8	8
Sand, very coarse, and fine gravel, pink to brown	3	11
Silt; contains fine to very fine sand; buff to gray	11	22
Sand, very fine to coarse; contains fine gravel; light-brown to pink to tan	2.5	24.5
Silt, slightly clayey; contains very fine sand and marl	10.5	35

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska—Continued

KEITH COUNTY, NEBR.—Continued

B14-38-30dc—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Sandstone, calcareous, silty, light-buff to gray	5	40
Silt; contains very fine to coarse sand; light-buff	3	43
Sandstone, very fine grained, calcareous, light-buff to gray	1.5	44.5
Sand, very fine, and silt; light-green to gray	8.5	53
Sandstone, very fine grained to fine-grained, calcareous, buff to light-gray	9	62
Silt; contains very fine sand; buff to gray	30	92
Sand, very fine to very coarse; contains fine gravel; light-brown to pink to tan	13	105
Sandstone, very fine grained to fine-grained, calcareous, light-brown to pink	2.5	107.5
Sand, very fine to fine; contains silt and very red clay	7.5	115
Sand, medium to coarse; contains fine gravel; pink to tan	2	117
Sandstone, fine- to coarse-grained, silty, tan to buff	3	120
Sandstone, very fine, silty, clayey, calcareous, gray to white	9	129
Sand, very fine to fine; contains some medium sand; brown to tan	6	135
Sand, medium to coarse; contains fine gravel; brown	5	140
Sandstone, fine- to medium-grained, silty, clayey, red	5.5	145.5
Sand, silty, fine to coarse, partly cemented, tan	7.5	153
Sandstone, fine to coarse, calcareous, white to tan	1.5	154.5
Sand, very fine to medium, silty, red to brown	3	157.5
Sandstone, fine to coarse, calcareous, white to tan	6	163.5
Sand, fine to very coarse, silty, slightly cemented, very calcareous, white to tan	66.5	230
Sand, very fine to medium; contains some coarse sand; tan; contains green clay fragments	5	235
Sand, very fine to medium, calcareous, dark-green to light-brown	41	276
Volcanic ash, gray to white	4.5	280.5
Siltstone, sandy, light-brown to green	7	287.5
Sandstone, very fine grained, silty, calcareous, light-brown to white	3	290.5
Sand, very fine to medium; contains fragments of clay; light-tan to gray	31.5	322
Clay, silty, very light-tan	3	325
Sand, very fine to coarse, green to gray; contains light-tan clay and coarse gravel	25	350
Sandstone, very fine grained, light-brown to pink	7.5	357.5
Sand, fine to medium, slightly silty, light-brown to pink; contains tan clay	2	359.5
Brule formation:		
Clay, silty, pink to tan grading to gray	30.5	390

B14-40-21aa

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,665 feet]

Road fill	3	3
Ogallala formation:		
Silt, gray to black to brown	4.2	7.2
Silt, slightly clayey; contains some sand; light-green to brown	2.8	10
Silt; contains very fine sand; buff to brown	20	30
Sand, very fine to slightly silty, buff to brown to green	98	128
Sand, very fine; contains some coarse to very coarse sand; silty, brown to pink to tan; contains caliche	23.8	151.8
Silt, slightly sandy; contains caliche	5.7	157.5
Sand, very coarse; contains some silt; pink to tan	2.5	160
Sand, very coarse; contains some fine gravel; pink to tan	10	170
Sand, very coarse, and fine gravel; pink to tan; contains caliche	10	180
Sand, very fine to very coarse, gray to brown	11.5	191.5
Silt, slightly sandy to clayey, reddish-brown	4.5	196
Silt, slightly sandy; contains calcareous layers; white to brown	14	210
Sand, medium to very coarse, pink to brown to tan	20	230

Logs of test holes, wells, and seismograph shot holes in the lower South Platte River valley, Colorado and Nebraska— Continued

KEITH COUNTY, NEBR. — Continued

B14-40-21aa—Continued

	Thickness (feet)	Depth (feet)
Ogallala formation—Continued		
Silt, greenish-brown; contains caliche	15	245
Silt, slightly sandy and clayey, reddish-brown; contains caliche	30	275
Silt, sandy, dark-buff to pink to brown; contains caliche	20	295
Sand, very fine to coarse, silty, calcareous, olive-green; contains caliche	12	307
Sand, very fine to very coarse, and silt; tan to brown; contains caliche	23	330
Sand, very fine to very coarse, and fine gravel, pink to tan; contains caliche	10	340
Silt, calcareous, sandy, pink to brown to tan	40	380
Sand, medium; contains fragments of clay; gray to brown to red; contains white calcareous rootlets	40	420
Sand, fine to coarse, yellow to tan to brown; contains white calcareous rootlets	18.5	438.5
Brule formation:		
Clay, silty, blocky, red to brown	21.5	460

B14-40-33dd

[Sample log of test hole drilled by Conservation and Survey Division of the University of Nebraska, 1949. Surface altitude, 3,611 feet]

Road fill	1.5	1.5
Pleistocene and Recent deposits, undifferentiated:		
Clay, loamy, silty, gray to black	1.5	3
Ogallala formation:		
Silt, slightly clayey, light-brown	4	7
Sand, very fine, and silt; light-tan to brown	3	10
Silt, buff to reddish-brown	107	117
Sand, very fine to medium, greenish-brown to pink	3	120
Sand, silty, calcareous, green to white to brown	15	135
Sand, very fine to very coarse, brown; contains calcareous nodules	5	140
Sand, fine to coarse, and fine gravel; brown to pink to tan	10	150
Sand, very fine to coarse, gray to brown	2	152
Silt, dark-brown	3	155
Silt, sandy, brown to buff	5	160
Sand, fine to coarse, and fine gravel; yellow to pink to tan	43	203
Silt, sandy, brown to buff	9.5	212.5
Silt, slightly sandy, calcareous, gray to white	1.5	214
Silt, sandy; contains caliche	3.5	217.5
Sand, very fine to coarse, green to tan	10	227.5
Silt, very slightly clayey, red to brown	2.5	230
Silt, red to brown	10	240
Silt, sandy, brown to light-brown	7.5	247.5
Sand, very fine to medium, green to brown to tan	4	251.5
Silt, slightly sandy, light-brown to reddish-brown	28.5	280
Silt; contains fine to medium sand; gray to white	10	290
Sand, very fine to very coarse, and fine gravel; yellow to pink to tan; calcareous	15	305
Sand, very fine to coarse, silty, light-brown to tan	25	330
Sand, very fine to medium, slightly silty, light-brown; contains calcareous nodules	23.8	353.8
Sand, very fine to coarse, white to green to gray	15.7	369.5
Silt, sandy, clayey, calcareous, gray to white to brown; contains caliche	60.5	430
Brule formation:		
Clay, silty, blocky, red to brown	20.	450

APPENDIX C

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska

Well number: See text for description of well-numbering system.
Type of well: DD, dug and drilled well; Dn, driven well; Dr, drilled well; Du, dug well; J, jetted well; Sp, spring.
Depth of well: Measured depths are given in feet and tenths below measuring point; reported depths are given in feet below land-surface datum.
Type of casing: C, concrete (brick, tile, or pipe); N, none; P, iron or steel pipe; T, clay tile; W, wood.
Character of material: C, clay or sandy clay; G, gravel; R, rock, undifferentiated; S, sand; Sh, shale; Ss, sandstone.
Geologic source: A, alluvium; B, Brule formation; D, dune sand; F, Fox Hills sandstone; L, Laramie formation; O, Ogallala formation; P, Pierre shale; R, residual soil.
Method of lift and type of power (first letter): C, cylinder; F, natural flow; H, horizontal centrifugal; J, jet; N, none; P, pitcher pump; T, turbine; V, vertical centrifugal. (Second and third letter): D, diesel engine; E, electric motor; G, gasoline engine; H, hand operated; T, tractor; W, windmill.
Use of water: D, domestic; I, irrigation; In, industrial; N, none; O, observation; P, public supply; S, stock.
Measuring point: Bpb, bottom of pump base; Btr, bolt in tree root at edge of pond; Cic, center of iron cap on casing 20 feet north of pump; Ds, pumphouse doorsill; Fs, floor surface; Hc, hole in casing; Hpb, hole in pump base; Hwc, hole in well cover; Idp, invert of discharge pipe; Ls, land surface; Tc, top of casing; Tcc, top of casing of center well; Tce, Top of casing of east well; Tcn, top of casing of north well; Tdp, top of discharge pipe; Tfb, top of flange of pump base; Tmc, top of manhole collar; Tol, top of oil line; Tpc, top of pit curb; Tph, top of pump head; Tpp, top of pump platform; Tvp, Top of vent pipe; Twc, top of well cover.
Depth to water: Measured depths to water level are given in feet, tenths, and hundredths; reported depths are given in feet.
Yield: M, measured; R, reported.
Remarks: Alt, altitude obtained by altimeter; Ari, automatic recorder installed; Bf-30, Brule formation at 30 feet (or depth shown); Bw-2, battery of 2 wells (or number shown); Cow, constructed as observation well; Eob, ends on bedrock; EoBf, ends on Brule formation; Eos, ends on shale; L, log of well given in Appendix B; Nwp, nearby well pumping; Ofw, once a flowing well; Pt, pumping test made at well; S-90, shale at 90 feet (or depth shown); Sam, south of area included in project maps; Sca, sample collected for analysis; Ssu, sprinkling system used; Tdtw, tile drains tap aquifer and bring water to well; Tw, trench or pit well; U-2, unused 2 years (or number shown).

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
Adams County, Colo.																			
C1-59-31bd1	Lee brothers........	......	Dr	32.0	15	P	S,G	A	T,G	I	Bpb	0.5	....	11.20	Dec. 14, 1948	....	......	30	Sam.
-31bd2	......do...............	......	Dr	....	......	P	S,G	A	T,G	I	......	......	....	....	....	....	......	40	Do.

C1-60-2cc	V. H. Lohman	1942	Dr	115	18	P	S, G	A	T, T	I	Tc	0	4,791.52	26.75	Dec. 26, 1947	R900	.....	50	
-3bc	L. Musgrave	1945	Dr	103	12	P	S, G	A	T, E	I	Tc	0	4,794.68	24.15	....do	R700	.....	100	Eos.
-4ac	Watson & Smith	.....	Dr	104	24	P	S, G	A	T, E	I	Hpb	1.5	4,796.17	26.67	....do	.....	.....	150	Do.
-4cb	W. L. Freeman	1943	Dr	102	18	P	S, G	A	T, E	I	Tc	1.0	4,793.78	24.51	....do	M900	27	150	
-4cc	....do	1939	Dr	86	18	P	S, G	A	T, E	I, O	Tc	.5	4,801.41	24.30	Oct. 8, 1947	M395	29	.....	Do.
-4dd	Gene Freeman	1946	Dr	120	18	P	S, G	A	T, E	I	Tc	.5	.....	35.74	Nov. 3, 1949	M750	36	.....	Do.
-5dc	Earl Anderson	1949	Dr	87.0	24	P	S, G	A	T, G	I	Tc	0	.....	26.99	June 20, 1949	.....	.....	100	S-90.
-9ac	F. W. Kunce	1944	Dr	120	18	P	S, G	A	T, E	I	Ls	.....	.....	30	.....	R1,000	.....	100	Eos.
-9bc	....do	1945	Dr	90	18	P	S, G	A	T, E	I	Hpb	1.0	4,809.96	24.60	Dec. 26, 1947	R1,000	.....	80	Do.
-9cc	....do	1948	Dr	116	24	P	S, G	A	T, E	I	Tc	.5	4,809.57	27.04	Nov. 4, 1948	R1,000	46	.....	Do.
-10db	E. Pippett	1942	Dr	128	18	P	S, G	A	T, E	I	Tc	0	4,804.64	22.75	Dec. 26, 1947	R800	.....	100	Do.
-13aa	John Fitzpatrick	.....	Dr	22.0	5	P	S, G	A	C, W	S	Tc	1.0	4,785.04	21.50	Dec. 14, 1948	.....	.....	.....	
-14ac	....do	1943	Dr	130	18	P	S, G	A	T, E	I	Tc	0.5	4,807.12	28.65	Dec. 13, 1948	R950	.....	90	Eos.
-17cd	Carl Sanden	1944	Dr	102	18	P	S, G	A	T, E	I	Hpb	1.0	4,825.92	27.11	Dec. 10, 1948	R900	30	150	Do.
-17dc	....do	1942	Dr	100	18	P	S, G	A	T, E	I, O	Hpb	1.3	4,832.12	32.15	Oct. 8, 1947	.....	.....	.....	
-18dd	.....	.....	Dr	37.3	6	P	S, G	A	C, H	D	Tc	.8	4,835.91	31.15	Apr. 13, 1948	.....	.....	.....	
-19cc	Carl Broughton	1944	Dr	90	18	P	S, G	A	N	N	Tc	.0	4,858.65	32.50	Dec. 15, 1948	R200	50	.....	Eos, U-2.
-20bd1	Frank Kunce	1944	Dr	85	18	P	S, G	A	T, T	I	Hpb	1.5	4,842.76	34.38	Dec. 10, 1948	.....	.....	70	Eos.
-20bd2	....do	1946	Dr	85	24	P	S, G	A	T, T	I	Tc	1.5	4,842.79	34.13	....do	.....	.....	70	Do.
-20cc	E. E. Douglas	.....	Dr	.....	18	P	S, G	A	T, T	I	Tc	0	4,851.66	37.81	Nov. 4, 1948	.....	.....	.....	
-20cd	....do	.....	Dr	80	18	P	S, G	A	T, E	I	Hpb	1.0	4,852.91	40.59	....do	.....	.....	.....	
-23ca	Asa Currier	1946	Dr	127	18	P	S, G	A	T, G	I	Hpb	.5	4,828.27	36.74	Dec. 14, 1948	R1,000	24	100	L.
-23cd	C. F. Little	1946	Dr	128	18	P	S, G	A	T, E	I	Hpb	.5	4,832.67	37.80	....do	R1,100	26	100	Eos.
-25cc	C. W. Leasure	1941	Dr	122	18	P	S, G	A	T, E	I	Bpb	1.0	4,845.08	46.09	....do	R850	.....	80	Eos. Sam.
-26bd	Vernon Schade	1944	Dr	122	18	P	S, G	A	T, E	I	Hpb	1.0	4,835.30	36.58	....do	R1,100	25	100	Do.
-26dd	....do	1938	Dr	122	18	P	S, G	A	T, E	I	Hpb	2.0	4,844.67	46.69	....do	R850	.....	60	Do.
-29cb1	J. D. Singleton	1933	Dr	87	24	P	S, G	A	T, E	I, O	Hpb	1.6	4,869.01	35.15	Oct. 8, 1947	R320	.....	40	Do.
-29cb2	....do	1942	Dr	86	18	P	S, G	A	T, E	I	Tc	1.0	4,865.53	32.42	Dec. 15, 1948	R600	.....	40	Do.
-30cd	G. R. Wilson	.....	Dr	.....	36	C	S, G	A	N	N	Tc	1.0	4,873.68	27.90	....do	.....	.....	.....	Sam.
-31cc1	Boughman Land Co.	.....	Dr	.....	.....	P	S, G	A	T, E	I	.....	.....	.....	.....	.....	R300	.....	.....	Do.
-31cc2	....do	1946	Dr	89	.....	P	S, G	A	T, E	I	.....	.....	.....	.....	.....	R600	.....	.....	Eos, Sam.
-35cb	Asa Currier	1946	Dr	121	18	P	S, G	A	T, E	I	Hpb	1.0	4,852.80	43.42	Dec. 14, 1948	R1,200	11	160	Do.
C1-63-10aa	Alton Belts	.....	Dr	130	18	P	S, G	A	T, E	I	Ls	.....	.....	117	.....	R80	4	1	S-176, Ssu.
C2-60-6cc	Paul Holmquist	.....	Dr	89	18	P	S, G	A	T, T	I	Tc	0	.....	19.68	Nov. 4, 1948	R600	.....	.....	Eos, Sam.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Adams County, Colo.—Continued										
C2-60-19bc	Oscar Helgeson........	......	Du	20	120	W	S, G	A	N	O	Tpp	0.5	....	18.23	Aug. 26, 1947	R600	.....	.....	Sam.
-27ba	John Ford..............	1947	Dr	96	18	P	S, G	A	T, T	I	Tc	.4	....	29.00	Dec. 14, 1948	R700	50	.....	Sam, Eob.
C2-61-1cd	Paul Holmquist	1948	Dr	80	18	P	S, G	A	T, T	I	Tc	.5	....	16.90	Nov. 4, 1948	R700	.....	.....	Sam, Eos.
									Logan County, Colo.										
B6-51-1dd	Charles Green.........	1949	Dr	195.0	6	P	S, G	O	C, W	D, S	Tpp	0.5	4,491.0	150.15	May 16, 1950	....	.....	.....	
-3dd	....	......	Dr	185.0	6	P	S, G	O	C, W	S	Tc	.3	4,558.0	175.50	.....do..........	....	.....	.....	
-6ca	Raymond Fennel	1910	Dr	300	6	P	S, G	O	C, W	S	Tc	.5	4,376.5	109.93	.....do..........	....	.....	.....	
-9ba	....	......	Dr	......	10	P	S, G	O	C, W	S	Tc	.5	4,573.5	153.49	.....do..........	....	.....	.....	
B6-52-1cc	C. Koehler	......	Dr	152.5	6	P	S, G	O	C, W	D, S	Tc	0	4,307.0	107.00	May 12, 1950	....	.....	.....	
-12cb	....	......	Dr	150	6	P	S, G	O	C, W	S	Tc	2.0	4,320.90	113.00	.....do..........	....	.....	.....	
-13cb	....	......	Dr	88.3	6	P	S, G	O	C, W	S	Tc	0	4,354.40	73.11	.....do..........	....	.....	.....	
-30dc	....	......	Dr	......	8	P	S, G	O	C, W	S	Tc	1.0	4,183.05	23.78	July 27, 1949	....	.....	.....	
B6-53-4aa	Mrs. K. Yamado.....	1938	DD	......	14	P	S, G	A	H, T	I	Tpc	2.5	4,005.73	9.01	Jan. 14, 1948	....	.....	50	
-4ac	......do................	1945	Dr	70	18	P	S, G	A	T, G	I	Hpb	.5	4,008.69	9.04	.....do..........	....	.....	50	
-8bb	W. T. Houton.........	1946	Dr	50	....	P	S, G	A	T, T	I	Ls	......	....	9	....	....	.....	110	Eos.
-9dc	Schott brothers........	1936	Dr	78	18	P	S, G	A	T, T	I	Ls	......	....	12	....	....	.....	150	
*10cc	F. J. Jones..............	1934	Dr	90	16	P	S, G	A	T, T	I	Tvp	1.0	4,022.15	8.80	Aug. 22, 1947	R1,250	.....	160	
-10dc	Phil Hessler............	......	Dr	73	14	P	S, G	A	T, T	I	Tfb	0	4,026.32	14.70	Aug. 27, 1947	R1,200	.....	102	L.

-11ca	T. A. Propst	......	Dr	......	8	P	S, G	A	C, W	S	Tpp	1.0	4,014.87	12.85	May 10, 1949	....	.....	.....	
-13cb	....	......	Dr	48.0	5	P	S	D	C, W	S	Tc	1.0	4,066.64	37.40	July 27, 1949	....	.....	.....	
-15bb	Victor Hessler	......	DD	106	12	P	S, G	A	H, T	I	Tpc	0	4,024.33	8.01	Aug. 22, 1947	....	.....	83	
-16ad	N. Sanders	1936	Dr	96	16	P	S, G	A	T, G	I	Tc	0	4,037.63	18.83	.....do	R800	.....	150	
-16dd	H. E. Ballin	1934	Dr	80	16	P	S, G	A	T, T	I, O	Tc	1.0	4,044.76	23.80	.....do	R900	5	109	
-17dc	A. M. Davis	1939	DD	......	16	P	S, G	A	H, T	I	Tpc	-1.0	4,034.26	10.55	.....do	R650	.....	100	
-18cc	E. P. Morlan	1940	DD	75	12	P	S, G	A	H, T	I	Tpp	.6	4,035.61	7.45	Aug. 19, 1947	....	.....	25	
-20ad	William Fritzler	1947	Dr	100	18	P	S, G	A	T, T	I	Hpb	1.0	4,048.78	23.78	Apr. 8, 1949	....	.....	200	
-20dd	Conrad Karg	1945	Dr	98	18	P	S, G	A	T, E	I	Bpb	0	4,058.48	25.21	Oct. 8, 1947	R1,400	14	105	Eos.
-21ac	Tom Smart	1942	Dr	80	14	P	S, G	A	T, E	I	......	......	....	....	....	R1,100	.....	116	
-21cc	Alex Schott	1947	Dr	96	18	P	S, G	A	T, T	I	Ls	......	....	32	....	R1,600	.....	100	Eos.
-22bd	T. A. Smart	......	Dr	......	6	P	S, G	A	C, W	S	Tc	1.0	4,059.01	27.50	Aug. 29, 1947	....	.....	.....	
-28ab	Alex Schott	......	Dr	......	6	P	S, G	A	C, H	D	Tc	0	4,067.85	33.50	Aug. 27, 1947	....	.....	.....	
-29aa	Conrad Karg	1936	DD	96	12	P	S, G	A	H, E	I	Tpc	-8.0	4,047.66	12.50	Oct. 7, 1947	R1,030	14	105	Eos
-29cd	Alex Schott	1937	DD	100	12	P	S, G	A	H, E	I	Tpc	1.5	....	12	....	R1,080	15	160	Eos, Bw-2.
-30bc	C. E. Gaines	1946	Dr	110	18	P	S, G	A	T, G	I, O	Tc	1.5	4,052.42	13.70	Aug. 21, 1947	R1,800	10	140	Sca.
-30cc	G. Lutin	1943	Dr	......	.....	P	S, G	A	T, E	I	Ls	......	4,054.4	14	....	R1,200	.....	160	
-30dd	Mr. Helmut	......	Dr	27.0	6	P	S, G	A	C, E	S	Tpc	0	4,062.10	13.02	Aug. 29, 1947	....	.....	.....	
B6-54-1aa	George Stairs	1905	Dr	83	6	P	S, G	A	C, W	S	Ls	......	4,118.71	40	....	....	.....	.....	
-11dd	....	......	Dr	......	6	P	S, G	A	C, H	S	Tpp	0	4,095.57	17.10	Sept. 5, 1947	....	.....	.....	
-12ad	Mr. Clemens	......	Du	45.0	48	C	S, G	A	C, W	S	Tpp	.5	4,079.04	12.01	.....do	....	.....	.....	Eos.
-13da	Town of Merino	1919	Dr	70	24	P	S, G	A	H, E	P	Tpc	0	....	8.81	Nov. 21, 1949	R400	3	.....	Eos, Sca.
-14da	J. Helmut	......	Dr	130	6	P	S, G	A	C, E	D	Ls	......	....	25	....	....	.....	.....	
-20dd	Mr. Herman	......	Dr	176	.....	P	S	D	C, W	D, S	Ls	......	....	164	....	....	.....	.....	
-23cc1	N. A. Nelson	1936	DD	67	12	P	S, G	A	H, T	I	Tpc	1.0	4,061.40	22.61	Aug. 18, 1947	R800	.....	75	Nwp.
-23cc2	......do	1946	Dr	78	18	P	S, G	A	T, E	I	Hpb	0	4,060.96	17.20	Sept. 5, 1947	R1,800	17	75	Eos.
-23db	Bill's Motor Co.	1946	Dr	89.0	18	P	S, G	A	T, G	I	Tc	.5	4,053.78	12.68	Aug. 19, 1947	....	.....	.....	
-24aa	Wayne Rossen	......	DD	68	12	P	S, G	A	H, T	I	Tpc	0	4,038.41	5.99	.....do	R1,000	.....	70	Eos.
-24bc	N. A. Nelson	1939	DD	78	....	P	S, G	A	H, T	I, O	Tpc	0	4,048.68	9.70	.....do	....	.....	20	Do.
-24bd	R. Hessler	1941	DD	72	....	P	S, G	A	H, T	I	Tpc	0	4,044.16	7.75	.....do	R1,400	.....	78	Do.
-24cc	Albert Archer	1937	DD	80	12	P	S, G	A	H, G	I	Ls	......	....	8	....	R1,200	.....	100	
-25cc	J. Marquis	1947	Dr	56	18	P	S, G	A	T, T	I	Tpb	2.5	4,061.04	12.03	Aug. 28, 1947	....	.....	60	
-26bb	A. E. Burky	......	DD	60	12	P	S, G	A	H, G	I	Tpc	0	4,060.21	14.45	Aug. 19, 1947	R500	.....	30	
-29bc	Cecil Nicholson	......	Dr	280	6	P	S, G	A	C, W	D, S	Ls	......	....	160	....	....	.....	.....	Sca.
-32ba	....	......	Dr	72.5	4	P	S, G	A	C, W	S, O	Tc	1.5	4,175.60	62.98	Sept. 4, 1947	....	.....	.....	
-34dd	K. Shino	1932	Dr	......	.....	P	S, G	A	T, E	I	Tfb	1.3	4,070.40	9.20	Aug. 18, 1947	R1,400	.....	140	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallon per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Logan County, Colo.—Continued																		
B7-50-3ab	M. Monroe	......	Dr	300	6	P	R	O	C, W	D	Tpp	0.8	4,370.39	84.50	July 26, 1949	......	......	......	
-4cc	V. Hastings, Jr.	......	Dr	340	6	P	R	O	C, W	D	Tpp	.5	4,417.45	93.00	....do....	......	......	......	
-30bb	......	......	Dr	......	6	P	R	O	C, W	S	Tpp	0	4,449.12	187.10	July 27, 1949	......	......	......	
B7-51-1dc	August Frank	......	Dr	105.0	4	P	R	O	C, W	S	Tc	3.0	4,478.39	98.50	....do....	......	......	......	
-2cb	E. E. Sonnenberg	......	Dr	......	6	P	R	O	C, W	S	Tpp	2.0	4,360.51	48.80	....do....	......	......	......	
-8ac	Carl Sherwin	......	Dr	......	6	P	S	D	C, W	D, S	Ls	......	4,209.3	50	......	......	......	......	
-12bd	August Frank	......	Dr	147.0	6	P	R	O	C, W	S	Tpp	.6	4,481.05	130.10	July 27, 1949	......	......	......	
-20ad	......	......	Dr	46.0	6	P	S	D	C, W	S	Tpp	2.0	4,309.62	41.65	July 19, 1949	......	......	......	
-24aa	A. E. Kellogg	......	Dr	190	6	P	R	O	C, W	D	Ls	......	4,440.8	168	......	......	......	......	
B7-52-3bb	Union Pacific RR.	1923	Dr	100	8	P	S, G	A	T, E	In	Ls	......	......	80	......	R230	18	......	
-4ac1	......	1949	Dr	......	18	P	S, G	A	T, T	I	Tc	1.0	3,940.22	8.12	May 13, 1949	......	......	......	
-4ac2	......	......	Dr	......	6	P	S, G	A	N	N	Tc	0	3,940.57	8.01	June 2, 1949	......	......	......	
-5ba	Great Western Sugar Co.	1905	DD	......	12	P	S, G	A	H, E	In	Tpc	.3	......	1.78	May 11, 1950	R1,000	......	......	Bw-15.
-5bb	P. Bowie	......	Dr	435	6	P	R	P	C, E	D	Ls	......	......	12	......	......	......	......	Sca.
-7ab	Henry Schaffer	1934	DD	70	14	P	S, G	A	H, T	I	Tpc	0	3,961.93	14.47	Jan. 12, 1948	......	......	80	
-7ac	......do......	1939	DD	84	12	P	S, G	A	H, T	I, O	Tpc	.4	3,964.16	12.05	Sept. 8, 1947	......	......	74	
-7ba1	City of Sterling	1920	Dr	95	12	P	S, G	A	N	N	Tc	0	......	27.25	Jan. 12, 1948	......	......	......	
-7ba2	......do......	1942	Dr	105	......	P	S, G	A	T, E	I	Ls	......	......	27	......	R250	......	......	
-7bc	G. G. Kloberdanze	1939	DD	90	12	P	S, G	A	H, T	I	Tpc	.7	3,968.44	13.15	Jan. 13, 1948	R1,300	......	122	

-7cc	John Amen	1939	DD	80	12	P	S, G	A	H, G	I	Tpc	0	3, 971.52	12.25	Nov. 23, 1949	...	...	100	
-8dd	Clifford Sherwin	1936	DD	55	14	P	S, G	A	H, T	I	Ls	...	3, 953.6	...	...	R1, 800	...	100	
-9dc	......do	...	Dr	35	6	P	S	D	C, W	S	Tc	1.0	3, 956.84	14.80	May 10, 1949	...	...	...	Sca.
-20aa	Mr. Reily	...	Dr	...	6	P	S, G	A	C, W	S	Tpp	0	3, 967.32	13.15	....do	...	...	...	
-24cc	...	...	Dr	...	6	P	S	D	C, W	S	Tc	0	4, 248.00	30.52	May 16, 1950	...	...	...	
B7-53-1cc	Edward Fritzler	1936	Dr	92	16	P	S, G	A	T, T	I	Hc	1.5	3, 975.83	16.42	Jan. 13, 1948	...	...	138	L.
-1dc	S. Kloberdanz	1936	DD	87	12	P	S, G	A	H, T	I	Tpc	0	3, 970.38	11.60	.....do	R1, 100	...	72	
-1dd	J. Kloberdanz	1936	DD	117	14	P	S, G	A	H, G	I	Ls	...	3, 968.1	11	...	R1, 500	...	119	
-6dd	...	...	Dr	120.0	8	P	R	P	N	N	Tc	0	4, 181.61	79.23	Nov. 22, 1949	...	...	...	
-10cc	Ben Berholt	1941	Dr	93	18	P	S, G	A	T, T	I	Tc	.5	4, 053.55	33.41	May 12, 1949	R600	...	...	
-11dd	Glen Morris	1940	Dr	96	12	P	S, G	A	T, G	I	Ls	...	...	18	...	R1, 200	...	80	
-12cc	......do	1936	DD	100	12	P	S, G	A	H, G	I	Tpc	0	3, 983.06	16.79	Dec. 29, 1947	R1, 600	...	200	
-13ac	John Reilly	1934	DD	78	...	P	S, G	A	H, G	I	Tpc	1.0	3, 979.95	13.93	Dec. 30, 1947	...	...	145	Bw-4.
-13ad	G. Brunkhart	1938	DD	...	18	P	S, G	A	H, T	I	Tpc	.0	3, 975.92	13.00	Jan. 13, 1948	...	...	67	
-13bc	John Lebsock	1934	DD	80	...	P	S, G	A	H, E	I	Ls	...	...	14	...	R1, 575	...	140	Bw-3.
-13ca	Carl Miller	1936	DD	60	14	P	S, G	A	H, G	I	Tpc	.5	3, 985.93	17.30	Dec. 30, 1947	R1, 000	...	80	
-13cb	......do	1939	Dr	68	12	P	S, G	A	T, T	I	Ls	...	4, 002.9	31	...	R800	...	35	
-13cc	Tony Forando	1940	Dr	99	16	P	S, G	A	T, G	I	Tc	.2	3, 999.42	27.10	Dec. 30, 1947	R1, 300	...	80	U-4.
-14ac	Victor Basseggio	1939	Dr	102	18	P	S, G	A	T, T	I	Ls	...	4, 006.3	34	...	R1, 600	...	...	Eos, U-3.
-16cc	Jake Amen	1938	Dr	78	14	P	S, G	A	T, E	I	Ls	...	4, 046.2	18	...	R938	...	150	Eos.
-17bc1	A. R. Long	...	DD	...	...	P	S, G	A	H, T	I	Ls	...	...	17	...	R500	...	...	Bw-3.
-17bc2	......do	1946	Dr	46	18	P	S, G	A	T, E	I	Hpb	1.8	4, 067.78	17.20	Dec. 11, 1947	M680	14	...	Eos.
-17dc	Paul Lebsock	1946	Dr	69	18	P	S, G	A	T, T	I	Tc	1.0	4, 053.86	18.41	.....do	R1,800	40	130	Eos.
-18ba	Dr. J. Price	1947	Dr	60	18	P	S, G	A	T, E	I	Tc	.8	4, 089.10	21.70	.....do	M1,100	23	100	Eos.
-18bb1	......do	1948	Dr	48	18	P	S, G	A	T, E	I	Tc	2.0	4, 087.52	14.38	Apr. 8, 1949	...	...	...	
-18bb2	......do	1949	Dr	48	18	P	S, G	A	T, E	I	...	...	...	...	...	...	...	...	
-18bc	......do	1949	Dr	65	18	P	S, G	A	N	N	Tpp	0	4, 101.76	30.44	May 31, 1949	...	...	...	
-18bd	......do	1947	Dr	48	18	P	S, G	A	T, E	I, O	Hpb	2.2	4, 085.77	18.73	Dec. 11, 1947	M680	25	100	Eos, Sca.
-18cb1	Ronald Brunkhardt	1949	Dr	84	18	P	S, G	A	T, E	I	Tc	1.0	...	18.16	Dec. 7, 1949	...	...	...	
-18cb2	......do	1949	Dr	84	18	P	S, G	A	T, E	I	Tc	0	...	16.28	.....do	...	...	...	
-19aa	J. Amen	1947	Dr	66	18	P	S, G	A	T, E	I	Tc	.5	4, 073.51	24.78	Nov. 23, 1949	...	...	...	
-20ab	Mr. Pomeroy	1946	Dr	69	18	P	S, G	A	T, E	I	Ls	...	4, 053.3	18	...	R1,000	...	...	Eos.
-21bb	Hessler brothers	1939	Dr	78	16	P	S, G	A	T, T	I	Ls	...	4, 046.7	20	...	M800	20	100	Eos, L.
-21bc	......do	1939	Dr	75	16	P	S, G	A	T, T	I, O	Hpb	0	4, 041.90	17.15	Aug. 28, 1947	M610	19	65	S-77.
-23bb	William Nisson	1940	Dr	102	16	P	S, G	A	T, T	I, O	Hc	1.4	4, 013.45	29.45	Sept. 8, 1947	...	...	...	L.
-23bc	C. Mabe	1935	Dr	100	18	P	S, G	A	T, T	I	Tc	1.0	4, 013.93	30.61	Jan. 19, 1948	R1,100	...	...	Eos.
-24aa	Jacob Bratzman	1940	DD	81	12	P	S, G	A	H, G	I	Tpc	1.0	3, 986.68	15.75	Jan. 13, 1948	...	...	70	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Logan County, Colo.—Continued																		
B7-53-24ac	Mr. Kellogg.........	1940	DD	....	18	P	S, G	A	H, G	I	Tpc	2.5	3,988.38	17.53	Jan. 13, 1948	....	.....	50	
-24ad	Mrs. G. Henderson.	....	DD	87	12	P	S, G	A	H, T	I	......	......	....	....	....	....	.....	.....	
-24bc	E. Miller............	1936	Dr	93	18	P	S, G	A	T, E	I	Tc	1.5	3,989.46	15.23	Jan. 13, 1948	R300	.....	70	
-24cc	......do...............	1947	Dr	90	18	P	S, G	A	T, E	I	Ls	......	....	14	....	R1,200	.....	100	
-25dc	Alex Fiebig.........	1944	Dr	25	6	P	S, G	A	N	O	Tc	.5	3,986.96	8.74	Sept. 12, 1947	....	.....	.....	
-25dd	David Hammil......	....	Dr	22.0	6	P	S, G	A	N	O	Tc	.5	3,988.92	9.30	.....do...........	....	.....	.....	S-69.
-26ab	Ben Fish..............	....	DD	....	12	P	S, G	A	H, G	I, O	Tc	-5.4	3,992.03	3.25	Sept. 8, 1947	....	.....	.....	
-26bb	Miss Wedig..........	1942	DD	78	12	P	S, G	A	H, G	I	Tpc	.5	4,000.66	15.71	Nov. 4, 1947	R1,200	.....	60	
-27ab	Mr. Heiderman....	1946	DD	90	14	P	S, G	A	H, D	I	Ls	......	....	19	....	R1,000	.....	157	Bw-2.
-27bb	Kalach and Bishop..	1936	Dr	90	14	P	S, G	A	T, T	I	Ls	......	....	20	....	R1,300	.....	160	
-27ca	C. J. Kaufman.....	....	Dr	230	6	P	Sh	P	C, E	D	......	......	....	....	....	....	50	.....	Sca.
-27db	......do...............	1937	Dr	90	18	P	S, G	A	T, G	I	Tc	1.0	4,007.89	15.90	Jan. 14, 1948	R1,400	.....	80	Eos, L, U-4.
-29ac	Mr. Pomroy.........	....	Dr	....	6	P	R	P	C, W	D, S	Tpp	.5	....	48.75	May 11, 1949	....	.....	.....	
-30ab	R. Amen..............	....	Dr	....	.....	P	R	P	C, W	S	Tpp	0	4,109.07	53.44	Nov. 23, 1949	....	.....	.....	
-31cd	George Stairs........	....	Dr	35.0	6	P	S	D	C, W	S	Tpp	.5	4,082.22	20.10	May 11, 1949	....	.....	.....	
-33aa	David Wagner.......	1935	DD	70	12	P	S, G	A	H, T	I	......	......	....	....	....	R800	.....	47	
-34ac	A. Weatherall.......	....	DD	....	.....	P	S, G	A	H, T	I	Tpc	1.5	3,995.95	6.00	Jan. 19, 1948	R1,400	.....	187	
-36dd	Mr. Logan............	....	Dr	60	6	P	S	D	C, W	S	Tpp	.6	....	21.80	May 9, 1949	....	.....	.....	
B7-54-11bb	Fred Van Gundy.....	1946	Dr	32	18	P	S, G	A	T, E	I	Tc	.6	4,111.70	8.77	Dec. 12, 1947	R450	.....	.....	Eos.
-11bd	......do...............	1946	Dr	32	18	P	S, G	A	T, E	I	Hpb	.5	4,110.73	10.27	.....do...........	R450	.....	.....	Eos.

-12bc	John Amen	1916	DD	40	12	P	S, G	A	H, T	I, O	Tpc	0	4, 102.81	10.95	Sept. 8, 1947	R1, 400		130	Bw-3.
-12cb	......do	1949	Dr	40	18	P	S, G	A	T, T	I, O	Hpb	1.5		12.97	Feb. 7, 1950				Bw-3.
-13dc	Paul Reiboldt	1940	Dr	80	24	P	S, G	A	T, E	I	Hpb	0	4, 101.76	21.89	Dec. 11, 1947	R500	38	80	Eos.
-24aa			Dr		8	P	S, G	A	N	N	Tc	0	4, 088.64	18.25	May 24, 1949				
-24dd	Howard Kershner		Dr		6	P	R	P	C, W	D	Tc	.5	4, 163.56	100.90	Nov. 23, 1949				
B8-49-9da	Clyde Saylor		Dr	131.0	5	P	R	O	C, H	D	Tc	-3.0	4, 227.21	110.40	July 26, 1949				
-10bb	Town of Flemming	1920	Dr	190		P	R	O	T, E	P	Ls		4, 233.8	168		R50	22		
-18aa			Dr		6	P	R	O	C, W	D, S	Tpp	0	4, 274.42	144.50	July 26, 1949				
-21aa			Dr	400		P	R	O	C, W	D, S	Tc	0	4, 285.43	174.78	Aug. 15, 1949				L.
-27bb			Dr		6	P	R	O	C, W	S	Tpp	.8	4, 224.16	32.30	July 26, 1949				
-30aa	Mr. Youel		Dr	165.0	6	P	R	O	C, W	S	Tpp	.2	4, 283.33	158.30	.....do				
B8-50-3aa	Mr. Cool		Dr	160	6	P	R	O	C, W	D	Tpp	.5	4, 235.96	125.50	July 22, 1949				
-3dd			Dr	287	6	P	R	O	C, W	D	Tpp	.3	4, 369.66	150.10	.....do				L.
-5ba	Harris Ranch		Dr	102	6	P	R	O	C, W	S	Tc	.3	4, 126.95	97.82	Mar. 17, 1950				
-7ad	......do		Dr	122	6	P	R	O	C, W	S	Tc	1.0	4, 280.48	113.20	.....do				
-9db			Dr		6	P	R	O	C, W	S	Tc	1.3	4, 254.30	95.10	July 22, 1949				
-13ba			Dr		6	P	R	O	C, W	D	Tpp	.7	4, 306.12	171.40	July 26, 1949				
-14dd	H. J. Fetzer		Dr			P	R	O	C, W	D	Tpp	1.0	4, 347.41	190+	......do				
-16dd	E. Miles		Dr	310	6	P	R	O	C, W	D, S	Tpp	1.0	4, 362.30	181.50	......do				L.
-17bd	Harris Ranch		Dr	150.0	6	P	R	O	C, W	S	Tc	.5	4, 308.02	141.50	Mar. 16, 1950				
-19aa	......do		Dr	98	6	P	R	O	C, W	D, S	Ls		4, 378.6	65					
-29bc	......do		Dr	230	6	P	R	O	C, W	S	Hpb	.6	4, 419.68	172.40	Mar. 16, 1950				
-31dc			Dr			P	R	O	C, W	D	Tc	0	4, 447.60	145.10	.....do				
B8-51-6ad	Victor Ramey	1943	Dr	82	18	P	S, G	A	T, D	I, O	Hpb	0	3, 889.31	19.80	July 29, 1947	R2, 200	8	300	
-6bc	J. W. Held		DD	86		P	S, G	A	H, G	I	Tpc	0	3, 884.31	11.50	.....do	R2, 200	12	220	Bw-2.
-6bd	School district	1938	Dr	35	6	P	S, G	A	C, H	P, O	Tpp	.2	3, 883.58	11.34	Sept. 12, 1947				
-7bc			Dr		6	P	S, G	A	C, W	S	Tpp	0	3, 900.69	22.70	May 13, 1949				
-12cd	Harvey L. Harris		Dr	118	6	P	R	O	C, W	S	Tc	0	4, 167.95	107.20	Mar. 16, 1950				
-24ca	......do		Dr	400	6	P	R	O	C, W	S	Ls		4, 150.4	320					
B8-52-6aa	C. Knudson	1935	DD	30	16	P	S, G	A	H, T	I	Tc	0	4, 054.77	3.10	July 28, 1947	R800		85	Bw-3.
-7ab	John Ills	1936	Dr	90	18	P	S, G	A	T, T	I	Tdp	2.5	4, 002.11	40.51	.....do	R1, 150	12	90	
-8aa	F. Millelstadt		Dr	76		P	S, G	A	T, T	I	Hpb	.5	3, 978.87	30.40	July 29, 1947	R1, 000		80	Eos, U-3.
-9bb	Mrs. Hatfield	1936	Dr	69	16	P	S, G	A	T, T	I	Ls		3, 975.1	32		R1, 130		90	
-10ac	G. A. Henderson	1916	DD	90	12	P	S, G	A	H, T	I, O	Tpc	1.6	3, 905.60	5.36	Sept. 9, 1947	R600		132	Bw-3, U-3.
-17cb	Joseph Willson	1939	Dr	72	18	P	S, G	A	T, E	I, O	Hpb	.4	3, 985.27	18.90	July 28, 1947				L.
-18bb	A. J. Bartholomew	1935	Dr	70	24	P	S, G	A	T, E	I	Hpb	0	4, 013.24	48.21	May 5, 1948	R900	12	75	Bw-2.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Logan County, Colo.—Continued										
B8-52-21ac1	H. W. Wagner......	1940	DD	80	12	P	S, G	A	H, T	I	Ls	......	3,922.1	8	......	R1,450	......	75	Bw-3.
-21ac2	......do......	1948	Dr	435	6	P	R	P	J, E	D	......	......	......	......	......	......	......	......	Sca.
-21ad	L. Padroni......	1937	Dr	80.0	18	P	S, G	A	T, G	I	Hpb	0	3,918.75	10.22	Jan. 21, 1948	......	......	39	
-21bd	H. W. Wagner......	1915	DD	100	12	P	S, G	A	H, T	I	Ls	......	3,924.3	10	......	......	......	......	Bw-3.
-21cc	Mr. Schultz......	1929	DD	90	12	P	S, G	A	H, E	I	Ls	......	......	9	......	......	......	80	Bw-3, L.
-23ca	......	......	Dr	......	6	P	S, G	A, D	C, W	S	Tpp	1.0	3,919.27	16.30	May 13, 1949	......	......	......	
-26bb	C. B. & Q RR. Co..	1949	Dr	72	12	P	S, G	A, D	T, E	In	Bpb	3.0	......	43.33	May 11, 1950	R700	......	......	Eos.
-27ad	......do......	1949	Dr	78	12	P	S, G	A, D	T, E	In	Bpb	2.0	......	36.20	......do......	R700	......	......	Eos.
-27cc	Lewis Knudson......	......	DD	50.0	18	P	S, G	A	H, G	I	Tpc	0	3,928.28	13.50	Jan. 21, 1948	R600	......	20	U-2.
-27db	Earl Henry......	1945	Dr	64	18	P	S, G	A	T, T	I	Hpb	.5	3,927.89	14.05	Jan. 21, 1948	R1,500	2	15	
-27dc	City of Sterling.....	1941	Dr	87	18	P	S, G	A, D	T, E	P	Hpb	-4.0	3,960.80	49.26	Nov. 21, 1949	R400	15	......	
-28ab	Boettcher Hog Co..	1940	Dr	70.0	18	P	S, G	A	T, T	I	Hpb	.5	3,927.56	10.98	Jan. 21, 1948	R1,280	......	......	
-28ca1	Harley Grubbs......	1937	DD	82	12	P	S, G	A	H, T	I	Tpc	.5	3,930.41	9.80	......do......	R1,000	......	93	
-28ca2	Public Service Co..	1942	Dr	60	36	P	S, G	A	T, E	In	Tc	2.5	......	8.05	May 11, 1950	R1,200	8	......	
-28ca3	......do......	1940	Dr	60	48	P	S, G	A	T, E	In	Tc	2.5	......	4	......	R1,200	18	......	S-72.
-31bd	C. Luft......	1938	Dr	90	18	P	S, G	A	T, E	I	Hpb	2.0	......	15.36	Nov. 23, 1949	R1,000	16	35	U-3.
-33ba	F. Hergenreter......	1915	DD	70	12	P	S, G	A	H, E	I	Ls	......	......	4	......	......	......	110	Bw-2.
-34ab	City of Sterling.....	1941	Dr	89	18	P	S, G	A, D	T, E	P	Hpb	-3.0	3,967.89	56.19	Nov. 21, 1949	R400	15	......	Eos.
-34ac	......do......	1942	Dr	114	18	P	S, G	A, D	T, E	P	Hpb	-6.0	3,988.70	75.83	Nov. 17, 1949	R400	15	......	Eos, Sca.
-34b	......do......	1920	DD	47-	10	P	S, G	A, D	H, E	P	Tmc	-3.0	......	8.48	May 15, 1950	R2,000	3	......	Bw-28.

-34bd1	do.	1942	Dr	78	18	P	S, G	A, D	T, E	P	Hpb	-3.0	3,954.98	39.83	Nov. 21, 1949	R400	15	.....	Eos.
-34bd2	.....	.....	Dr	.....	6	P	S, G	A, D	C, W	S	Tpp	0	3,960.56	41.90	May 13, 1949	.....	.....	.....	
-34ca	City of Sterling	1945	Dr	78	18	P	S, G	A, D	T, E	P	Hpb	-3.0	3,956.53	40.62	Nov. 21, 1949	R400	15	.....	Eos.
-34cb1	G. W. Miller	1939	Dr	50	16	P	S, G	A	T, T	I	Tc	0	3,930.01	8.74	Jan. 21, 1948	.....	.....	16	
-34cb2	City of Sterling	1945	Dr	65	18	P	S, G	A, D	T, E	P	Hpb	-4.0	3,942.09	23.86	Nov. 22, 1949	R400	15	.....	Eos.
-34cc1	do.	1948	Dr	71	18	P	S, G	A, D	T, E	P	Hpb	-5.0	3,951.00	31.16	do.	R400	15	.....	L.
-34cc2	do.	1948	Dr	80	18	P	S, G	A, D	T, E	P	Hpb	-5.0	3,963.72	42.57	do.	R400	15	.....	
B8-53-24dd	Alex Luft	.....	Dr	48	6	P	S, G	A	C, W	S	Tpp	1.0	4,004.74	20.10	May 12, 1949	.....	.....	.....	
-25dc	.....	.....	Dr	.....	18	P	S, G	A	N	N	Ls	.....	3,980.6	18.5	do.	.....	.....	.....	
-36da	City of Sterling	.....	Dr	30	6	P	R	P	J, E	P	Ls	.....	.....	25	.....	.....	.....	.....	
B9-49-28bc	C. H. Stephans	.....	Dr	191	6	P	S, R	D, O	C, W	D	Ls	.....	4,245.5	188	.....	.....	.....	.....	
-29da	do.	.....	Dr	.....	6	P	S, R	D, O	C, W	S	Ls	.....	4,244.4	216	.....	.....	.....	.....	
B9-50-1ba	.....	.....	Dr	.....	6	P	S, G	D, A	N	N	Tc	1.0	3,830	72.60	Aug. 3, 1949	.....	.....	.....	Alt.
-18bc	.....	.....	Dr	60.0	6	P	S, G	D, A	C, W	S	Hc	.2	.....	59.10	May 16, 1949	.....	.....	.....	
-21cc	Harris Ranch	.....	Dr	.....	.....	P	S	D	C, W	S	Ls	.....	.....	44	.....	.....	.....	.....	
-30ab	do.	.....	Dr	.....	6	P	S	D	C, W	S	Ls	.....	.....	120	.....	.....	.....	.....	
-33dc	do.	.....	Dr	144	6	P	S	D	C, W	S	Ls	.....	4,267.7	130	.....	.....	.....	.....	
B9-51-2cb	Mr. Henry	.....	Dn	.....	1½	P	S, G	A	P, H	D	Tfb	2.0	3,823.73	11.12	May 20, 1949	.....	.....	.....	
-4ad	Fred Constana	.....	Dr	51.0	6	P	S, G	A	C	D, S	Tpp	1.0	3,886.08	50.25	May 19, 1949	.....	.....	.....	
-9bb	.....	.....	Dr	80.0	6	P	S, G	A	C, W	S	Tc	1.0	3,872.71	29.10	May 12, 1949	.....	.....	.....	
-14ad	H. Elliot	1946	Dr	.....	18	P	S, G	A	T, G	I	Tc	1.5	3,826.60	20.40	June 8, 1949	R2,000	14	.....	
-16ab1	Town of Iliff	1946	Dr	70	8	P	S, G	A	T, E	P, O	Hpb	1.0	3,835.21	5.50	Sept. 9, 1947	R150	.....	.....	Eos, Sca.
-16ab2	P. J. Zink	1939	Dr	220	6	P, N	R	P	J, E	D	Ls	.....	.....	6	.....	R50	12	.....	Sca.
-19bd	John Gork	.....	Dr	.....	6	P	S, G	A	C, W	D, S	Tpp	.7	3,858.95	7.60	May 20, 1949	.....	.....	.....	
-21ca	L. A. Williamson	.....	DD	.....	.....	P	S, G	A	H, E	I	Tc	-3.8	3,835.09	2.20	July 29, 1947	.....	.....	.....	Bw-3.
-21cc	F. E. Garfield	1910	DD	100	.....	P	S, G	A	H, T	I	Ls	.....	3,863.1	24	.....	R1,300	3	.....	
-22bc	Dr. McHue	1946	Dr	.....	18	P	S, G	A	T, E	I	Ls	.....	3,834.1	9	.....	R2,000	.....	100	
-23ac	G. Elliot	.....	Du	.....	48	C	S	D	C, W	S	Tpp	2.0	3,845.32	28.26	May 16, 1949	.....	.....	.....	
-28ad	Ivan Baren	.....	Dr	45	6	P	S, G	D, A	C, W	D, S	Tc	2.0	3,880.51	42.40	May 13, 1949	.....	.....	.....	
-28bd	.....	.....	Dr	.....	6	P	S, G	A	C, W	D, S	Tpp	1.0	3,867.91	27.60	May 13, 1949	.....	.....	.....	
-29ab	Frank Manuello	1949	Dr	310	6	P	R	P	C, H	D	Bpb	.5	.....	0.00	Sept. 21, 1949	.....	.....	.....	Ofw, Sca.
-29dd	Edgar Dorn	1941	Dr	80	.....	P	S, G	A	T, G	I	Hpb	0	3,874.91	25.17	July 29, 1947	R1,600	6	80	
-30cc	James De Soto	1947	Dr	106	.....	P	S, G	A	T, E	I	Tc	.7	3,866.95	8.20	May 10, 1948	.....	.....	160	
-30cd	do.	1920	DD	90	.....	P	S, G	A	H, T	I	Tpc	0	3,863.78	5.21	July 28, 1947	.....	17	160	Bw-4.
-31bb	Frank Manuello	1946	Dr	106	.....	P	S, G	A	T, E	I, O	Hpb	1.0	3,866.71	4.79	do.	.....	17	.....	
-31cc	Vincent Foppe	1945	Dr	82	.....	W	S, G	A	T, T	I	Bpb	0	3,892.27	26.15	do.	R1,500	14	132	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Logan County, Colo.—Continued										
B9-51-32ab	A. Padroni..........	1947	Dr	96	18	P	S, G	A	T, E	I	Tc	1.0	3,881.04	28.38	Feb. 6, 1948	R2,000	.....	.....	Eos.
-32bc	C. S. Mari	1920	Dr	90	.....	P	S, G	A	T, T	I	Tvp	0	3,889.37	31.90	May 13, 1949	R1,200	.....	65	U-3.
B9-52-13aa	P. Batalli	.....	Dr	.....	6	P	S, G	A	P, H	D	Tc	2.0	3,890.75	14.93	May 19, 1949	.....	.....	.....	
-13da	......do..........	.....	Dr	200	6	P	R	P	C, W	D, S	Tpp	.5	3,917.01	47.50	May 12, 1949	.....	.....	.....	
-27dd	Mr. Baccini	.....	Dr	.....	6	P	S, G	A	C, H	D	Tpp	.0	3,896.51	17.50	May 12, 1949	.....	.....	.....	
-33dd	Padroni brothers	.....	Dr	48	6	P	S, G	A	N	N	Tc	0	3,923.49	27.20	.....do..........	.....	.....	.....	Sca, S-40.
-35ac	Miss L. Johnson.....	.....	Dr	53.0	20	P	S, G	A	T, T	I, O	Tc	.4	3,882.25	10.98	Sept. 9, 1947	R900	.....	20	
-36db	Mrs. L. Johnson	1942	Dr	60	.....	P	S, G	A	T, T	I	Hpb	.6	3,871.00	5.55	July 29, 1947	.....	8	90	
-36dc	J. A. Lambert........	.....	Dr	70	.....	P	S, G	A	T, T	I	Hpb	1.5	.....	5.25	July 28, 1947	R1,500	.....	65	
B10-48-4bc	John Apts..............	1947	Dr	38.0	18	P	S, G	A	T	I, O	Tc	.7	3,676.05	6.73	June 24, 1948	R1,250	.....	100	Sca.
-4cc	S. P. Rosenbaum ...	.....	Dr	40	24	P	S, G	A	T, E	I	Tc	0	3,676.17	3.12	June 16, 1948	.....	.....	300	
-6cb	....	.....	Dn	.....	2	P	S, G	A	C, W	S	Tpp	.5	3,691.80	3.00	June 15, 1949	.....	.....	.....	
-7bd	M. Huss	1936	Dr	40	24	P	S, G	A	T, E	I	Hpb	1.0	3,691.28	5.15	June 16, 1948	R700	.....	200	U-3.
-7da	George Waltz.........	1933	Dr	40	24	P	S, G	A	T, E	I	Tc	0	3,685.77	5.80	.....do..........	.....	.....	60	U-4.
-8ba	J. M. Frank..........	1942	Dr	42	72	.....	S, G	A	T, E	I	.....	.....	.....	.....	.....	R2,000	.....	300	
-11ac	Sprague brothers.....	.....	Dr	.....	6	P	S, G	A	C, W	S	Tc	1.0	3,686.63	37.20	Mar. 22, 1950	.....	.....	.....	S-298.
-11bb	V. Sprague...........	.....	Dr	.....	6	P	S, G	A	C, W	S	Tpp	1.0	3,683.85	18.25	May 24, 1949	.....	.....	.....	
-16db	Tamarack Ranch ...	.....	Dr	.....	6	P	S, G	A	C, W	S	Tpp	0	3,705.10	18.95	.....do..........	.....	.....	.....	
-19cb	......do..............	.....	Dr	.....	6	P	S, G	A	C, W	S	Tc	0	3,718.86	23.95	May 20, 1949	.....	.....	.....	

B10-49-2cb	G. E. Henry	1937	Dr	32	18	W	S, G	A	T, T	I, O	Tpp	1.5	3,712.70	7.12	Sept. 16, 1947	R900	20		Sca.
-3dc	H. G. Wallensick	1935	Dr	34		W	S, G	A	T, T	I	Ls		3,719.5	6		R900	20		
-4ac	Mrs. Heying	1913	Du	58	6	P	S, G	A	C, W	D	Tpp	0	3,742.54	7.10	May 17, 1949				
-5cc	S. I. Davis		Dr	300	6	P	R	P	C, W	D, S	Tpp	1.2	3,802.50	45.13	Nov. 8, 1949				
-7da	Oliver Engleman	1937	DD	24	72	P	S, G	A	T, T	I	Tc	0	3,770.29	8.15	May 26, 1948	R900		100	Bw-4, Eos.
-8ca	do.		Dr	50	12	P	S, G	A	T, T	I	Tc	.8	3,754.36	22.51	do.	R400		50	Eos.
-8cc	do.	1946	Dr	52	18	P	S, G	A	T, E	I, O	Tc	3.0	3,755.58	18.20	Jan. 3, 1948	R1,050		200	Eos, Sca.
-9cc	Platte Valley Construction Co.	1946	Dr	40	16	P	S, G	A	T, E	I, O	Tvp	.6	3,730.88	5.59	Dec. 12, 1947				
-10dc1	Henry Laufer		Dr	43	24	P	S, G	A	T, T	I	Tc	0	3,715.22	3.74	May 28, 1948	R700		86	
-10dc2	Merle Rosen		Dr		18	P	S, G	A	T, E	I	Bpb	.4	3,714.44	4.42	do.			120	
-11cb	Town of Crook	1942	Dr	55	16	P	S, G	A	T, E	P	Hpb	1.0		3.60	June 28, 1949				Sca.
-11dc	Carl Waltz	1936	Dr	42	18	P	S, G	A	T, T	I	Ls			7		R1,300		63	U-3.
-12cb	A. J. Kaiser	1939	Dr	43	24	P	S, G	A	T, T	I	Ls		3,699.7	5		R1,000		96	Do.
-12cc	Fred Weimer	1938	Dr	39.0	24	P	S, G	A	T, T	I	Tc	.5	3,701.57	4.00	May 28, 1948	R700			Eos, U-3.
-12db	H. Rewerts	1934	Dr	42	24	P	S, G	A	T, E	I	Hpb	.5	3,698.69	3.92	do.	R2,000		253	
-14ab	G. Fortner	1937	Dr	40	24	P	S, G	A	T, T	I	Tc	1.0	3,704.17	3.82	do.	R1,200		80	Eos, U-4.
-15bb	Randall Shumate		Dr		24	P	S, G	A	T, E	I	Tc	.5		5.60	Nov. 8, 1949	R700	15	45	
-16ad	L. Unrein	1936	Dr	43	18	P	S, G	A	T, T	I	Hpb	1.0	3,721.84	5.14	May 28, 1948			68	
-16bb	Platte Valley Construction Co.	1938	Dr	30.0		P	S, G	A	T, E	I	Tc	0	3,730.82	5.00	May 26, 1948	R1,000		102	
-17ac	do.	1940	Dr	25	18	P	S, G	A	T, T	I	Tvp	.5	3,735.81	5.15	do.				
-17db	William Dick		DD	250	6	P	R	P	H, G	D						R50			S-75.
-18aa	Adam Koehler	1938	Dr	50	24	P	S, G	A	T, T	I	Tc	0	3,753.38	12.75	May 26, 1948	R900	25		Eos.
-20dd	George W. Condon		Dr		6	P	S, G	A	C, W	S	Tc	1.0	3,773.50	25.50	May 16, 1949				
-31bb	do.		Dr		10	P	S, G	D, A	C, W	S	Tc	0	3,784.04	38.70	do.				
-35bb	Tamarack Ranch		Dr		6	P	S, G	D, A	C, W	S	Tc	2.0	3,895.03	19.70	May 20, 1949				Sca.
B10-50-10cd	John McDonnel		Dr		6	P	S, G	A	N	N	Tc	0	3,865.42	45.55	May 17, 1949				
-12cd			Dr		6	P	S, G	A	C, H	D	Tc	1.0	3,800.91	23.25	do.				
-20dc			Dr		6	P	S, G	A	C, H	D	Tpp	.5	3,851.37	57.60	May 19, 1949				
-23ac	I. Debis, Sr.	1936	Dr	50	18	P	S, G	A	T, T	I	Tc	1.0	3,769.80	8.85	May 26, 1948	R1,500		160	Eos, U-2.
-24cd1	J. E. Ramsey	1930	Dr	385	4	P	R	P	C, H	D	Ls		3,750.0	3					Ofw, Sca.
-24cd2	do.		Dn	30	1½	P	S, G	A	C, W	S	Ls			3					Sca.
-27cc	D. B. Carwin	1940	DD	40	18	P	S, G	A	H, T	I	Tpc	0	3,775.33	3.52	June 17, 1948			10	
-28cd	L. A. Lamb	1943	Dr	37	6	P	S, G	A	N	O	Tpc	1.3	3,778.04	5.94	Sept. 16, 1947				
-31cc	C. Schott	1942	Dr	30	6	P	S, G	A	C, W	S	Ls		3,801.2	7.30	Nov. 9, 1949				
-32ca	R. E. Hielscher		Dr		6	P	S, G	A	N	N	Tpp	.9	3,789.63	4.95	May 20, 1949				
-34cd	G. Condon Ranch		Dr	31		P	S, G	D, A	C, W	S	Tc	1.0	3,805.30	21.00	June 8, 1948				Sca.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Logan County, Colo.—Continued										
B10-51-24aa	School district	......	Dr	28.0	8	P	S, G	A	C, H	P, O	Tc	1.2	3,907.19	14.12	Sept. 9, 1947	......	......	......	Sca.
-25dd	Mr. Bright	......	Dr	......	6	P	......	......	C, W	D	Tpp	.5	3,856.59	58.30	May 19, 1949	......	......	......	
-26dd	J. McBride	......	Dr	285	6	P	R	P	C, W	D	Tpp	.3	3,869.32	48.80	....do....	......	......	......	
-34aa	John Marteica, Jr.	......	Dr	300	6	P	R	P	N	N	Tpc	.5	3,861.59	37.30	....do....	......	......	......	
B11-48-24ad	D. Kruger	......	Dr	......	6	P	......	......	C, W	D	Tpp	.5	3,694.17	26.30	May 25, 1949	......	......	......	
-25cc	Clair Saylor	......	Dn	......	......	P	S, G	A	C, W	D, S	Tpp	0	3,646.53	1.60	June 15, 1949	......	......	......	
-26ad	E. Billingsley	......	Dr	100	6	P	S, G	A	C, W	D, S	Tc	0	3,673.06	65.80	....do....	......	......	......	
-26bc	A. Kaskey	......	Dr	......	6	P	S, G	A	C, W	D	Tc	.7	3,684.63	23.05	....do....	......	......	......	
-27ac	......	......	Dr	......	6	P	......	......	C, W	D	Tc	.7	3,690.21	24.02	....do....	......	......	......	
-28cd	Mrs. Eichenberger	......	Du	85	48	C	R	......	C, W	D	Tpp	1.5	3,714.55	25.90	....do....	......	......	......	
-31cc	......	......	Dr	......	6	P	......	......	C, H	D	Tc	0	3,703.51	5.80	....do....	......	......	......	
-34dc	John Apts	1929	Dr	36	48	P	S, G	A	T, T	I	Tc	2.7	3,663.25	6.32	June 24, 1948	R1,350	......	100	
B11-49-26cc	Mr. Karg	......	Dr	200	6	P	R	P	C, E	D, S	Ls	......	......	42	......	......	......	......	
-35cc	......	......	Dr	......	6	P	......	......	N	N	Tc	.8	3,720.49	2.65	May 17, 1949	......	......	......	
									Morgan County, Colo.										
B1-55-1cc	Mr. Morey	......	Dr	184.0	6	P	S, G, R	D, P	N	N	Tc	0	4,466.28	36.30	Oct. 29, 1947	......	......	......	
-2cc	David Peters	......	Dr	29	18,6	P	S, G	D	C, G	D	Tpp	1.0	4,424.70	17.25	....do....	......	......	......	Eos.

-3db	Cook brothers	......	Du	20	......	P	S, G	D, A	C, W	S	Ls	......	......	14	......	......	......	......	
-3dd	......do	......	Du	20.0	30	C	S, G	D, A	N	N	Tc	1.5	4,425.12	16.20	Oct. 29, 1947	......	......	......	
-4cc	David Peters, Jr	......	Dr	43.0	6	P	S, G	A	C, W	S	Tpc	2.0	4,391.53	27.42	......do	......	......	......	
-5cc	H. E. Shawcross	......	DD	48	......	P	S, G	A	H, G	I	Tpc	0	4,366.39	23.89	Oct. 2, 1947	......	......	......	Eos.
-5cd	F. R. Shawcross	1946	Dr	43	18	P	S, G	A	T, E	I	Tc	1.6	4,366.21	22.10	Aug. 12, 1947	R1,000	15	75	Eos, Sca.
-5dc	Ray Peed	1949	Dr	42	18	P	S, G	A	T, T	I	......	......	......	......	......	......	......	......	L.
-6ad	Bud Sandoz	1934	Dr	56	......	P	S, G	A	T, G	I	Tpp	1.0	4,367.05	30.05	Aug. 4, 1947	R1,200	17	130	Bw-2.
-6bc	G. J. Painter	1946	Dr	63	18	P	S, G	A	T, E	I	Bpb	0	4,364.00	29.40	Aug. 1, 1947	M710	15	60	Eos.
-6cc	J. Williams	1947	Dr	67	18	P	S, G	A	T, E	I	Hpb	1.5	4,374.90	35.30	Aug. 5, 1947	R1,150	......	105	Do.
-6dc	F. Stoops	1944	Dr	56	18	P	S, G	A	T, E	I	Hpb	0	4,370.37	30.30	Aug. 14, 1947	M390	16	60	Do.
-7ac	......do	1946	Dr	56	18	P	S, G	A	T, E	I	Tc	1.0	4,377.68	32.97	Oct. 2, 1947	M700	......	70	
-7bb	J. Williams	1944	Dr	......	18	P	S, G	A	T, E	I	Hpb	0	4,393.58	54.50	Sept. 17, 1947	M400	12	65	
-7bd	......do	1943	Dr	......	18	P	S, G	A	T, E	I	Hpb	.5	......	41.96	Oct. 2, 1947	R1,000	13	65	
-7cc	John Albers	1938	Dr	71	24	P	S, G	A	T, E	I	Tc	2.0	4,389.89	42.20	Sept. 17, 1947	M260	14	105	
-7dc	Joseph Williams	1944	Dr	......	18	P	S, G	A	T, E	I	Hpb	0	4,383.73	34.65	Aug. 5, 1947	......	......	70	
-8bc	John Olson	1949	Dr	......	18	P	S, G	A	T, E	I	Hpb	0	......	38.02	Nov. 16, 1949	......	......	......	
-8bd	......do	1939	Dr	43	14	P	S, G	A	T, E	I	Ls	......	......	20	......	M500	......	170	
-8cd	Glen Scott	1938	Dr	51	24	P	S, G	A	T, E	I	Tc	.7	4,385.02	32.10	Aug. 5, 1947	M430	......	......	Eos.
-8dc	......do	1946	Dr	59	......	P	S, G	A	T, E	I	Ls	......	4,396.1	30	......	M400	......	......	
-9ab	Mr. Hazuka	......	Du	36.0	36	......	S, G	D, A	C, W	S	Tpp	1.8	4,402.25	27.75	Oct. 29, 1947	......	......	......	
-10ad	John Staygert	......	Dr	45.0	6	P	S, G	D	C, H	S	Tc	1.0	4,452.25	38.60	......do	......	......	......	Eos.
-11aa	David Peters	......	Dr	22	......	P	S	D	C, W	S	Ls	......	4,435.1	12	......	......	......	......	
-16cc	Bert Peterson	......	Dr	......	6	P	S, G	A	C, W	S	Tc	.6	4,404.80	38.80	Aug. 12, 1947	......	......	......	
-17aa	Glen Scott	1940	Dr	57	18	P	S, G	A	T, E	I	Hpb	1.0	4,394.43	41.71	Oct. 2, 1947	M450	......	......	
-17ab	......do	1940	Dr	46	18	P	S, G	A	T, E	I	Tc	1.0	4,385.82	32.15	Aug. 6, 1947	M450	......	......	Eos.
-17cc	Jack Findeis	1947	Dr	83	18	P	S, G	A	T, E	I	Hpb	.5	4,416.25	55.20	......do	R800	......	60	Do.
-17db	H. Bolinger	......	Dr	50	......	P	S, G.	A	T, E	I	Ls	......	4,393.9	31	......	......	......	75	Do.
-17dd	......do	......	Dr	50	......	P	S, G	A	T, E	I	Hpb	0	4,394.09	31.90	Oct. 2, 1947	M400	12	75	Do.
-18ab	Conrad Hallihan	......	Dr	70	6	P	S, G	A	C, W	S	Ls	......	4,403.2	60	......	......	......	......	Do.
-18bc1	R. Awmiller	1937	Dr	68	18	P	S, G	A	T, E	I, O	Bpb	1.5	4,397.77	39.50	Aug. 6, 1947	M400	14	80	
-18bc2	......do	1948	Dr	......	18	P	S, G	A	T, E	I	Tc	1.5	......	43.08	Nov. 2, 1948	......	......	......	
-18cc1	Mitchell & Henderson.	1938	Dr	......	18	P	S, G	A	T, E	I	Hpb	1.5	4,403.50	42.46	Oct. 2, 1947	M400	13	90	
-18cc2	......do	1938	Dr	......	18	P	S, G	A	T, E	I	Hpb	2.0	4,402.98	42.17	......do	......	17	90	
-18dd	......do	1942	Dr	65	18	P	S, G	A	T, E	I	Hpb	.5	4,407.36	44.29	......do	M300	15	65	
-19ac	H. V. Tuttle	1940	Dr	55	24	P	S, G	A	N	N	Ls	......	......	27	......	......	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B1-55-19ad	H. V. Tuttle	......	Dr	38.0	6	P	S, G	A	C, H	D, S, O	Tc	1.1	4,401.90	33.95	Mar. 30, 1948	......	......	......	
-19ca	D. Kjeldgaard	1943	Dr	68	......	P	S, G	A	T, E	I	Hpb	1.0	4,409.90	40.34	Oct. 2, 1947	......	12	130	
-19cc	......do	1947	Dr	......	18	P	S, G	A	T, E	I	Hpb	1.5	4,413.35	40.00	Nov. 2, 1948	M400	20	......	
-19db	......do	1943	Dr	64	......	P	S, G	A	T, E	I	Hpb	.5	......	42.13	Oct. 3, 1947	......	12	130	
-20cc	L. W. Carter	1945	Dr	......	......	P	S, G	A	T, E	I	Hpb	0	4,418.15	44.10	Sept. 17, 1947	M350	20	60	
-30bd1	J. Bolinger	1946	Dr	......	......	P	S, G	A	T, E	I	Hpb	.5	......	38.64	Oct. 2, 1947	......	......	......	
-30bd2	......do	1946	Dr	70	......	P	S, G	A	T, E	I	Hpb	1.5	4,422.13	41.05	Mar. 30, 1948	M330	12	......	
-30cd1	......do	1937	DD	70	48	C, P	S, G	A	T, E	I	Ls	......	......	......	......	......	......	......	L.
-30cd2	......do	1937	DD	65	48	C, P	S, G	A	T, E	I	Tpc	0	......	37.75	Mar. 30, 1948	M610	15	......	S-70.
-31ca	......do	1948	Dr	64	18	P	S, G	A	T, E	I	Hpb	1.0	4,438.40	35.53	Dec. 8, 1948	M300	15	......	Eos, L.
-31cc	......do	1937	DD	......	......	C, P	S, G	A	T, E	I	Tpp	0	4,438.45	30.43	Nov. 3, 1947	M294	22	......	
-31cd1	......do	......	Dr	64	18	P	S, G	A	T, E	I	Hpb	1.3	4,438.79	32.51	Dec. 8, 1948	M200	17	......	
-31cd2	......do	1937	DD	......	......	C, P	S, G	A	T, E	I	Tpp	0	4,438.62	30.59	Nov. 3, 1947	......	22	......	
-31da	......do	......	DD	62	12	C, P	S, G	A	T, E	I, O	Tpc	0	4,437.92	37.20	Aug. 8, 1947	......	......	......	Sca.
-31dc	......do	......	DD	60	72	C, P	S, G	A	T, E	I	Ls	......	......	35	......	......	......	......	Eos.
-31dd	......do	......	DD	......	......	C, P	S, G	A	T, E	I	Tpc	0	4,440.44	33.45	Oct. 2, 1947	......	8	......	
-32ca	......	......	Dr	69	6	P	S, G	A	C, W	S	Ls	......	......	54	......	......	......	......	Eos.
-32cc	Mrs. Kranzer	1947	Dr	54	......	P	S, G	A	C, H	D	Ls	......	4,441.8	39	......	......	......	......	Do.
B1-56-1ac	Emil Kast	......	Dr	65	18	P	S, G	A	T, E	I	Hpb	.8	4,369.52	39.20	Aug. 4, 1947	......	......	149	
-1cd1	Mrs. W. Shaw	......	Dr	......	18	P	S, G	A	T, E	I	Hpb	.8	4,373.07	39.70	Oct. 2, 1947	M740	18	120	

-1cd2	do.	...	Dr	...	6	P	S, G	A	C, W	S, O	Hpb	.8	...	36.40	Mar. 31, 1948	...	...	...	
-1dc	do.	1937	Dr	72	48	P	S, G	A	T, E	I, O	Hwc	0	4,374.65	38.00	Oct. 2, 1947	R800	14	60	
-1dd	do.	1948	Dr	64	18	P	S, G	A	T, E	I	Hpb	.8	4,374.35	35.24	Mar. 30, 1948	M400	...	60	Eos.
-2dd	...	...	Dr	40.8	6	P	S, G	A	C, W	S	Tc	1.2	4,372.07	18.00	Oct. 30, 1947	...	...	...	Sca.
-3cc	...	...	Dr	31.0	6	P	S, G	A	N	N	Tc	.5	4,368.80	27.83	do.	...	...	...	
-4aa	Mr. Rasmussen	...	Dr	31.0	6	P	S, C	D, A	C, W	S	Tc	0	...	9.70	Oct. 15, 1947	...	...	...	
-5dc	S. Redeiss	...	Dr	39.0	6	P	S, C	D, A	C, W	S	Tc	1.0	4,426.5	15.50	do.	...	...	...	Sca.
-8ad	do.	...	Du	17	48	W	S, C	D, A	C, W	S	Tpp	0	4,414.2	12.10	do.	...	...	...	
-10aa	Max Peterson	...	Dr	37.0	6	P	S, G	A	N	N	Tc	1.5	4,360.31	29.47	Apr. 20, 1949	...	...	...	
-11ab	do.	...	Dr	34.0	6	P	S, G	A	C, W	S	Tc	2.0	4,370.68	33.80	Oct. 15, 1947	...	...	...	
-12bd	L. Ely	...	Dr	72	18	P	S, G	A	T, E	I	Hpb	2.2	4,382.28	38.87	Oct. 2, 1947	M425	17	100	Eos.
-12da	N. C. Wagers	1940	Dr	70	...	P	S, G	A	T, E	I	Hpb	.6	4,384.25	40.52	do.	M590	...	...	Sca.
-12dd	do.	1942	Dr	70	...	P	S, G	A	T, E	I	Hwc	.5	4,387.15	40.12	do.	M660	17	250	
-13aa	Max Peterson	...	Dr	...	14	P	S, G	A	T, E	I	Ls	...	4,390.9	39	...	...	...	...	
-13ad	do.	1936	Dr	65	48	P	S, G	A	T, G	I	Hwc	0	4,394.25	36.50	Aug. 6, 1947	R860	...	125	L.
-13bd	do.	1945	Dr	...	...	P	S, G	A	T, E	I	Hpb	1.0	4,395.47	39.30	Aug. 7, 1947	R800	...	30	
-13cc	do.	...	Dr	56.0	6	P	S	A	C, W	S, O	Tc	.5	4,404.07	43.05	Aug. 14, 1947	...	...	...	
-13dc	Victor Ostermiller	...	Dr	...	18	P	S, G	A	T, E	I	Hpb	1.2	4,408.09	46.80	Aug. 6, 1947	M385	13	70	
-13dd	do.	...	Dr	...	18	P	S, G	A	T, E	I	Bpb	.5	4,408.27	46.70	do.	M390	13	70	
-23dd	H. Queen	...	Dr	53	6	P	S, G	A	C, W	S	Ls	...	...	45	...	...	...	...	Eos.
-24dd	do.	1943	Dr	69	18	P	S, G	A	T, E	I	Hpb	1.5	4,413.86	38.83	Oct. 29, 1947	M400	11	50	
-25dd	do.	1941	Dr	54	18	P	S, G	A	T, E	I	Bpb	0	4,425.82	36.18	do.	R450	12	40	Eos.
-26ad	do.	...	Dr	51	6	P	S	A	C, W	S	Tpp	0	4,433.01	48.60	Aug. 14, 1947	...	...	...	Do.
-26cc	do.	...	Dr	350	...	P	S, R	A, P	C, W	S	...	...	...	...	...	...	...	...	S-60.
-36ba	J. C. Calflin	1947	Dr	57.0	6	P	S, G	A	C, W	S	Tc	.5	4,442.40	46.80	Aug. 14, 1947	...	...	...	Eos.
B1-57-4ac	F. M. VanTuyl	...	Dr	57.0	4	P	S, G	A	C, W	D, S	Tc	.8	4,446.58	43.00	June 5, 1947	...	...	...	Do.
-4bb	do.	1947	Dr	60.0	6	P	S, G	A	C, H	D, S	Tc	.5	4,432.69	39.00	do.	...	...	...	L.
-4bd	do.	1947	Dr	62	18	P	S, G	A	T, T	I	Hpb	1.4	4,447.90	43.05	do.	R700	...	90	Eos.
-4cc	Frank Dahm	1947	Dr	58.0	4	P	S, G	A	C, W	S	Tc	.5	4,448.04	39.50	June 9, 1947	...	...	...	Do.
-6cd	H. H. Geyer	...	Dr	...	6	P	S, Sh	D, P	C, G	D, S	Tc	.5	4,486.50	33.60	Feb. 11, 1949	...	...	...	
-6da	do.	...	Du	24.5	30	C	S	D, P	C, W	S	Tc	2.9	4,464.80	17.32	Oct. 16, 1947	...	...	...	Sca.
-7cb	Duane Nichols	...	Du	40	48	P	S	D	C, W	S	Twc	.6	4,493.91	29.55	do.	...	...	...	Eos.
-8da	K. E. Timpe	1946	Dr	52.0	6	P	S, G	A	C, W	D, S	Tc	.5	4,462.90	42.10	June 9, 1947	...	...	...	
-9cc	do.	...	Dr	38.0	8	P	S, G	A	C, W	S	Tc	2.0	4,459.21	33.20	do.	...	...	...	
-11bc	Mr. Moore	...	Du	57.0	30	P	S, Sh	D, P	C, W	S	Tc	1.0	...	29.50	Oct. 15, 1947	...	...	...	
B1-58-1aa	...	...	Du	43.0	24	C	C	D, P	C, H	D	Tpp	0	4,479.72	28.04	Oct. 16, 1947	...	...	...	
-2ca	Mr. Finnigan	...	Du	26.5	...	P	C	P	N	N	Tpp	1.0	...	25.50	do.	...	...	...	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B1-58-5aa	George Glenn......	......	Dr	20.0	10	P	S, G	A	C, W	S	Tc	0.5	4,636.28	14.76	Oct. 16, 1947	....	......	......	
-7ad	David Johnson	1947	Dr	19.0	10	P	S	.....	C, W	S	Tpp	.8	4,680.32	15.50	.....do.........	....	......	......	
-9cc	Wm. Musgrove......	......	Dr	40	12	P	S, G	A	T, T	I	Tc	1.0	4,654.32	8.62	.....do.........	....	......	60	L.
-11ba	Markham and Stitz.	......	Dr	475	......	P	S, R	P	C, W	D	Ls	......	4,569.6	200	....	....	......	......	
B1-59-4dc	E. Rosener.........	......	Dr	82.0	6	P	S, G	D, A	C, W	S, O	Tc	1.0	4,715.39	54.55	Oct. 16, 1947	....	......	......	
-5bc	F. Otteson	......	Dr	140	18	P	S, G	A	T, E	I	Hpb	.5	4,676.30	29.25	Oct. 30, 1947	M330	43	115	
-6bc	A. Neilson	......	Dr	131	18	P	S, G	A	T, E	I	Tol	1.0	4,684.14	38.90	Oct. 28, 1947	M865	......	100	Eos.
-6bd	......do..............	1946	Dr	131	18	P	S, G	A	T, E	I	Hpb	.8	4,680.10	37.04	Oct. 10, 1947	M940	14	100	Do.
-6cb	Carl Norgren	1947	Dr	110	18	P	S, G	A	T, E	I	Tol	1.0	4,687.98	37.70	Oct. 28, 1947	M770	45	120	Do.
-6cc	......do..............	1946	Dr	109	18	P	S, G	A	T, E	I	Tol	.5	4,690.01	34.50	.....do.........	M590	......	......	Do.
-7bc1	Rosener brothers....	1947	Dr	114	24	P	S, G	A	T, E	I	Tpp	.5	4,698.06	....	....	M935	40	150	Do.
-7bc2	E. Rosener..........	......	Dr	......	6	P	S, G	A	C, H	D	Tc	.8	4,696.68	32.47	Oct. 17, 1947	....	......	......	
-7cb	......do..............	1941	Dr	112	24	P	S, G	A	T, E	I	Fs	0	4,697.63	25.90	Nov. 25, 1947	M660	......	......	Eos.
-8ab	......do..............	......	Dr	115	......	P	S, G	A	C, W	D, S	Ls	......	4,679.1	15	....	....	......	......	Do.
-14bb	Mr. Haggerty	......	DD	250	48	P	S, Sh	D, P	C, W	S	Tpp	.5	4,801.0	80.00	Oct. 16, 1947	....	......	......	
-17dd	E. Rosener..........	1937	Dr	104	......	P	S, G	A	T, E	I	Ls	......	....	15	....	R1,700	......	479	Eos.
-18cc	Rosener brothers....	1941	Dr	58.0	18	P	S, G	A	N	O	Fs	0	4,707.51	15.80	Nov. 25, 1947	....	......	......	Ari.
-19bb	......do..............	1945	Dr	105	24	P	S, G	A	T, E	I	Ls	......	4,712.6	16	....	M1,320	......	......	Eos, Sca, Pt.

-19dd	Mr. Van Meter.....	....	Dr	106	18	P	S, G	A	T, E	I	Fs	1.0	4,722.89	20.77	Nov. 25, 1947	M680	......	......	Eos.
-20cc	Con Schaefer........	....	Dr	100	18	P	S, G	A	T, E	I	Fs	1.0	4,716.23	15.38	.....do..........	M665	40	230	L.
-30ba	Mr. Van Meter.....	1947	Dr	116	18	P	S, G	A	T, G	I	Fs	0	4,726.27	18.42	Nov. 26, 1947	M1,010	......	......	Eos.
B1-60-1ad	Ben McConnell.....	1948	Dr	110	18	P	S, G	A	T, G	I	Tc	.5	....	43.80	Oct. 21, 1948	M400	25	......	Do.
-1bb	Wade Brooks........	1944	Dr	113	18	P	S, G	A	T, E	I	Fs	.5	4,689.94	65.90	Nov. 25, 1947	R850	......	160	Do.
-1dd1	Ben McConnell.....	....	Dr	110	18	P	S, G	A	T, E	I	Hpb	.5	4,691.86	37.90	Oct. 28, 1947	M770	23	100	Do.
-1dd2	......do................	....	Dr	110	18	P	S, G	A	T, E	I	Ls	....	4,693.6	38	....	M200	......	100	Do.
-2cc	J. Everts.............	1935	Dr	72	16	P	S, G	A	T, E	I	Idp	.6	4,701.20	39.10	Apr. 30, 1948	R750	......	150	U-4.
-2dd	F. Harshman.........	1935	Dr	86	16	P	S, G	A	T, E	I, O	Hpb	1.0	4,697.11	38.74	July 17, 1947	M320	20	120	Sca.
-6dd	C. M. Roark.......	....	Dr	74.0	6	P	R	L	C, W	S	Tc	0	4,754.59	66.50	Oct. 17, 1947	....	......	......	
-7ba	......do................	....	Dr	84.0	6	P	R	L	C, W	S	Tc	.5	4,782.54	83.30	.....do..........	....	......	......	
-11ad	L. Templin..........	1947	Dr	106	18	P	S, G	A	T, E	I	Tc	1.6	4,702.22	36.22	Oct. 28, 1947	R1,100	......	120	Eos.
-11cc	Minnie Wekesser ...	1940	Dr	100	18	P	S, G	A	T, E	I	Tc	.8	4,717.51	38.90	Oct. 17, 1947	M540	46	160	Do.
-11cd	......do................	1946	Dr	90	18	P	S, G	A	T, E	I	Hpb	1.5	4,711.18	39.68	.....do..........	M655	40	160	Eos, L.
-11dc	W. Feyerherm	1941	Dr	90	18	P	S, G	A	T, E	I	Tc	.8	4,711.66	37.14	.....do..........	R1,100	......	110	Eos.
-12bc	L. Templin..........	1943	Dr	112	18	P	S, G	A	T, E	I	Hpb	.5	4,705.98	39.95	Oct. 28, 1947	M700	40	140	Do.
-12ca	J. E. Murphy........	1938	Dr	112	24	P	S, G	A	T, E	I	Ls	....	....	30	....	M380	.....	100	Do.
-12cc	Anna Hogan........	1945	Dr	116	18	P	S, G	A	T, E	I, O	Hpb	1.0	4,712.26	34.07	Oct. 30, 1946	M630	26	110	Do.
-12cd	......do................	1947	Dr	115	18	P	S, G	A	T, E	I	Hpb	1.5	4,711.60	36.20	Oct. 28, 1947	R1,200	......	120	Do.
-13bc	Jacob Rhon..........	1940	Dr	119	18	P	S, G	A	T, E	I	Ls	....	4,720.9	....	....	M1,130	......	140	
-13cd	......do................	1943	Dr	109	......	P	S, G	A	T, E	I	Hpb	1.0	4,724.50	30.12	Apr. 30, 1948	M700	26	140	
-13db	......do................	1945	Dr	130	18	P	S, G	A	T, E	I	Bpb	1.0	4,725.02	36.72	Nov. 25, 1947	M1,140	28	140	
-14ac	Richard Rankin.....	1938	Dr	80	48	P	S, G	A	T, D	I	Tc	-1.5	....	26.15	Dec. 18, 1947	R880	......	100	Eos.
-14bc	E. Rosener..........	....	Dr	......	......	P	S, G	A	T, E	I	Bpb	.8	4,722.48	29.69	Nov. 25, 1947	R900	......	136	
-22bc	......do................	1942	Dr	......	18	P	S, G	A	T, E	I	Tc	0	4,744.45	20.45	Nov. 26, 1947	....	.....	100	
-22dc	R. W. Clark........	1945	Dr	105	24	P	S, G	A	T, E	I	Hpb	1.2	4,742.91	14.65	.....do..........	R700	......	100	
-23bc	Louis Westhoff......	1940	Dr	89	30	P	S, G	A	T, E	I, O	Tc	.7	4,731.72	20.20	Nov. 4, 1947	R500	......	100	
-23cc	M. R. Brown........	1938	Dr	90	24	P	S, G	A	T, E	I	Ls	....	4,744.0	22	....	R1,000	......	190	
-24ab	Rufus Klein..........	1950	Dr	120	18	P	S, G	A	T, E	I	Hpb	-12.0	....	24.98	May 4, 1950	....	.....	160	Eos.
-26cc	D. Baumgardner....	1938	Dr	106	18	P	S, G	A	T, E	I, O	Hpb	.5	4,760.69	22.95	Oct. 3, 1947	M800	......	......	
-27bc	Rosener brothers....	1942	Dr	86	18	P	S, G	A	T, E	I	Hpb	.5	4,757.69	21.57	Nov. 26, 1947	M665	28	160	
-27db	H. Baumgardner....	1947	Dr	90	18	P	S, G	A	T, T	I	Tc	1.0	4,761.72	22.13	.....do..........	M530	30	120	Eos.
-27dc1	Baumgardner bros ..	1936	Dr	96	48	P	S, G	A	N	N	Hwc	0	4,763.41	21.85	Nov. 28, 1947	R1,200	......	......	Do.
-27dc2	......do................	1943	Dr	......	18	P	S, G	A	T, E	I	Ls	....	4,762.8	22	....	M800	......	120	
-27dd	Paul Wells...........	....	Dr	107	18	P	S, G	A	T, E	I, O	Tc	.5	4,762.06	20.94	Nov. 4, 1947	R800	......	120	Eos.
-28dc	M. R. Brown........	1947	Dr	97	18	P	S, G	A	T, E	I	Hpb	1.0	4,769.46	24.65	Nov. 28, 1947	R1,100	......	100	Do.
-32cc	F. A. Babcock......	1937	Dr	83	24	P	S, G	A	T, E	I	Fs	0	4,791.07	21.70	Dec. 5, 1947	R1,000	32	160	Do.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Morgan County, Colo.—Continued																		
B1-60-33ac	Roy Ray	1946	Dr	89	18	P	S, G	A	T, E	I	Hpb	0.5	4,772.87	19.50	Dec. 24, 1947	M760	28	120	L.
-33bc	A. E. Crandall	1948	Dr	81.5	24	P	S, G	A	T, T	I	Bpb	0	4,778.11	22.36	Dec. 10, 1948	R800	24	100	S-92.
-33cc	Frank Hall	......	Dr	......	24	P	S, G	A	T, E	I	Tc	.5	4,784.87	28.68	Nov. 28, 1947	M1,000	20	150	
-33dc	E. Watson	1947	Dr	96	18	P	S, G	A	T, E	I	Tc	0	4,787.72	28.69	.....do	M295	40	150	Eos.
-33dd	.....do	1944	Dr	100	18	P	S, G	A	T, E	I	Hpb	1.0	4,786.36	28.30	.....do	M250	37	150	Do.
-34ab	M. Johnson	1942	Dr	100	18	P	S, G	A	T, E	I	Ls	......	4,768.1	27	......	M506	......	160	
-34ac	.....do	1942	Dr	100	18	P	S, G	A	T, E	I	Hpb	0	4,772.07	27.00	Nov. 28, 1947	M506	......	160	
-34ba	P. E. Wells	1944	Dr	90	24	P	S, G	A	T, E	I	Tc	0	4,770.66	26.83	Nov. 26, 1947	M510	......	80	
-34bc	.....do	1942	Dr	96	......	P	S, G	A	T, E	I	Tc	.8	4,776.56	29.78	.....do	M295	......	80	
-34cc	E. Watson	......	Dr	......	18	P	S, G	A	T, E	I, O	Hpb	1.0	4,784.56	28.03	Oct. 8, 1947	M190	43	80	
-34dd	G. Baker	1944	Dr	......	24	P	S, G	A	T, E	I	Tc	0	4,773.37	20.10	Nov. 28, 1947	R1,250	35	150	
-36aa	......	......	Dr	32.0	6	P	S, G	A	C, W	S	Tc	1.0	4,736.33	13.06	Nov. 26, 1947	......	......	......	
B2-55-7ab	H. S. Tomky	......	Du	20	6	C	S	D, A	N	N	Tc	0	4,384.92	15.85	Aug. 12, 1947	......	......	......	
-7cd	B. Hunt	......	Dr	27.2	6	P	S	D, A	C, W	S	Tpp	0	4,319.40	24.10	.....do	......	......	......	Eos.
-8dd	J. Hunt	1947	Dr	23.0	6	P	S	D	C, W	S	Tc	1.5	4,528.84	20.60	.....do	......	......	......	
-17cc	Mr. Akerson	......	Dr	34.0	6	P	S	D, A	C, W	S	Tc	.6	4,439.00	26.30	Aug. 14, 1947	......	......	......	
-18bd	J. Hunt	1944	Dr	53	......	P	S, G	A	T, E	I	Hpb	0	4,315.41	20.15	July 23, 1947	R900	......	35	
-18cc1	T. Lewis	1910	DD	32	......	P	S, G	A	H, E	I	Tpc	0	4,318.16	11.75	July 25, 1947	......	......	105	
-18cc2	.....do	1944	Dr	45	24	P	S, G	A	T, E	I	Tpp	2.3	4,320.36	17.60	.....do	......	......	105	Eos.
-19db	A. Krehmeyer	1943	Dr	35	......	P	S, G	A	T, E	I	Hpb	.8	4,335.76	20.30	.....do	......	......	80	L.

-30bc1	Jacob Bickert.......	1929	Dr	64	36	P	S, G	A	T, D	I, O	Tce	3.8	4,347.16	29.50	Aug. 4, 1947	R875	9	180	Bw-3, Eos.
-30bc2	......do...............	1944	Dr	64	......	P	S, G	A	T, E	I	Hpb	2.5	4,344.45	26.30	Aug. 12, 1947	M1,330	10	40	Eos.
-30cc1	J & H Peterson.......	1937	Dr	60	18	P	S, G	A	T, E	I	Hpb	0	4,349.82	26.55	Aug. 1, 1947	M675	24	100	
-30cc2	......do...............	1944	Dr	60	18	P	S, G	A	T, E	I	Ls	....	4,350.9	26	....	M1,030	24	100	Eos.
-30dd	Peterson brothers ...	....	Dr	23.0	6	P	S, G	A	C, W	S	Tc	2.0	4,339.47	12.85	Aug. 13, 1947	....	......	......	
-31bd	D. Kjeldgaard.......	1948	Dr	....	18	P	S, G	A	T, E	I	Hpb	1.0	....	30.31	July 23, 1948	M735	12	......	
-31ca	......do...............	1948	Dr	69	18	P	S, G	A	T, E	I	Hpb	1.0	....	27.90	Mar. 29, 1948	....	......	......	L.
-31cc1	......do...............	1942	Dr	80	18	P	S, G	A	T, E	I	Bpb	.5	4,359.89	28.80	Aug. 4, 1947	M400	......	120	
-31cc2	......do...............	....	Dr	....	18	P	S, G	A	T, E	I	Hpb	.8	4,357.95	29.55	.....do..........	M670	15	120	
-31dd	McCurdy & McLagan	1944	Dr	51	18	P	S, G	A	T, E	I	Hpb	1.5	4,355.41	21.10	.....do..........	M720	......	120	Eos.
-32cd	....	....	Dr	25	6	P	S	D, A	C, W	S	Ls	....	4,362.4	15	....	....	......	......	
-33dc	R. Skiles............	....	Dr	130	......	P	S	D	C, W	S	Tc	.5	4,426.53	38.00	Aug. 13, 1947	....	......	......	
B2-56-1dd1	G. A. Foiles........	1947	Dr	....	......	P	S, G	A	T, E	I	Hpb	3.5	4,301.03	18.65	Aug. 4, 1947	....	......	......	
-1dd2	......do...............	1947	Dr	38	......	P	S, G	A	T, E	I	Hpb	1.0	4,300.67	19.00	July 18, 1947	....	......	80	Eos.
-1dd3	......do...............	1930	DD	36	......	P	S, G	A	N	O	Tcn	1.0	4,297.69	16.04	Aug. 6, 1947	....	......	......	Bw-7.
-2cd	A. Wilson............	....	Dr	80	18	P	S, G	A	T, T	I	Tc	2.2	4,305.07	14.00	July 18, 1947	R1,000	80	22	Eos.
-3dd	George Peterson	....	Dr	18.0	4	P	S	A	C, W	S	Bpb	1.0	4,307.79	9.78	Jan. 9, 1948	....	......	......	
-11ab	Mr. Jochum..........	1946	Dr	....	18	P	S, G	A	T, T	I	Bpb	1.4	4,306.89	17.65	July 18, 1947	R1,400	18	40	Eos.
-11db	B. E. Bass............	....	Dr	74	18	P	S, G	A	T, E	I	Tc	.5	4,310.82	18.80	.....do..........	M865	15	150	Do.
-11dc	H. Adams.............	....	Dr	79	18	P	S, G	A	T, E	I	Fs	.5	4,311.11	12	....	R1,000	26	160	
-12bb	C. Atkinson	1925	DD	40	120	C	S, G	A	H, D	I	Tpc	0	4,303.39	18.20	July 25, 1947	R900	13	69	
-12bd	......do...............	1918	DD	57	14	P	S, G	A	H, D	I	Ls	....	....	20	....	R1,300	12	54	Bw-3, Eos.
-12cd1	R. J. Winger.........	....	Dr	68	......	P	S, G	A	T, E	I	Hpb	1.0	4,309.41	15.40	July 18, 1947	R1,050	15	90	Eos.
-12cd2	......do...............	....	Dr	....	......	P	S, G	A	T, E	I	Bpb	.5	4,311.48	....	....	....	......	90	
-12da1	......do...............	1920	Du	47	60	P	S, G	A	N	O	Tpc	3.2	4,312.21	17.45	July 18, 1947	....	......	......	Ari.
-12da2	......do...............	....	Dr	58	18	P	S, G	A	T, E	I	Fs	2.9	4,309.10	21.04	Oct. 1, 1949	R500	......	90	Eos.
-12da3	......do...............	....	Dr	64	18	P	S, G	A	T, E	I	Tc	2.9	4,309.62	18.75	July 18, 1947	M780	14	90	Eos, Pt.
-12dd	Paul Norwood........	1939	Dr	54	24	P	S, G	A	T, E	I	Hpb	.8	4,311.36	17.35	.....do..........	M820	19	71	Eos.
-13aa1	J. L. Hunt............	1914	DD	50	12	P	S, G	A	N	O	Tcc	-2.5	4,300.53	1.60	July 23, 1947	....	......	......	Bw-7.
-13aa2	......do...............	1940	Dr	....	18	P	S, G	A	T, E	I, O	Bpb	1.0	4,307.45	8.28	.....do..........	M970	......	......	
-13bb	Victor Reichert......	1943	Dr	....	......	P	S, G	A	T, E	I	Fs	.8	4,321.22	23.20	July 18, 1947	R800	......	100	
-13db	H. F. Tomky........	1934	DD	40	12	P	S, G	A	H, G	I	Tpc	0	4,315.13	10.20	July 25, 1947	R1,000	......	49	Bw-3.
-13dc1	......do...............	1937	DD	....	12	P	S, G	A	H, T	I	Ls	....	....	10	....	R1,000	......	30	
-13dc2	C. F. Peterson.......	1929	Dr	53	14	P	S, G	A	T, E	I	Tc	-6.7	....	1.10	Mar. 30, 1948	R900	......	72	Eos.
-13dd	H. F. Tomky........	1942	Dr	61	......	P	S, G	A	T, E	I	Ls	....	....	14	....	M720	15	30	Do.
-17aa	....	....	Dr	60.0	6	P	S	A	C, W	S	Tc	.5	4,368.7	19.80	Apr. 22, 1949	....	......	......	
-24aa	Max Peterson.........	1928	Dr	60	14	P	S, G	A	T, E	I	Ls	....	....	14	....	....	......	60	Bw-2, Eos.
-24bc	H. C. Hoffman......	1939	Dr	62	24	P	S, G	A	T, E	I	Bpb	1.0	4,327.63	16.55	Sept. 17, 1947	R900	14	90	Eos.
-24ca1	W. H. August........	1939	Dr	62	18	P	S, G	A	T, E	I	Fs	0	4,329.40	16.22	Aug. 1, 1947	M1,060	24	180	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
										Morgan County, Colo.—Continued									
B2-56-24ca2	W. H. August......	......	Dr	......	6	P	S, G	A	C, W	S, O	Tc	.8	....	19.00	Mar. 29, 1948	......	....	.....	
-24dd1	......do..............	......	DD	61	12	P	S, G	A	H, E	I	Tc	-13.4	4,320.55	5.30	Aug 1, 1947	M990	....	160	
-24dd2	Max Peterson........	1933	Dr	58	48	P	S, G	A	T. E	I, O	Tc	0	4,331.51	16.50	July 25, 1947	M600	19	50	Eos.
-25cd	H. Martin............	1944	Dr	......	.....	P	S, G	A	T, E	I	Tc	1.0	4,349.84	25.05	Aug. 1, 1947	R900	......	60	
-25da	Laura Mitchell......	1947	Dr	65	18	P	S, G	A	T, T	I	Hpb	0	4,345.95	26.00	July 25, 1947	R900	17	65	
-25dd	......do..............	1939	Dr	60	24	P	S, G	A	T, E	I	Fs	0	4,349.22	26.60	.....do..........	M785	17	65	
-26dd	Mitchell & Henderson.	1942	Dr	74	18	P	S, G	A	T, E	I	Hpb	1.0	4,354.49	29.10	Aug. 4, 1947	M1,090	18	120	Eos.
-36dc	Charles S. Suhl.....	1938	Dr	76	24	P	S, G	A	T, E	I	Hpb	-2.6	4,362.94	31.40	Aug. 1, 1947	R1,475	......	135	Do.
B2-57-5ba	W. Hickman........	......	Dr	70	4	P	S, G	A	C, W	D, S	Tc	1.0	4,356.63	10.76	May 21, 1947	....	......	......	
-5bc	Rex Rogers..........	1948	Dr	104	18	P	S, G	A	T, E	I	Hpb	.8	....	16.80	Apr. 6, 1948	R1,200	......	140	Eos.
-5cc	Fred Wolf............	1937	Dr	70	18	P	S, G	A	T, E	I	Tc	.5	4,371.41	22.10	May 21, 1947	R980	......	150	
-5dd	....	......	Dr	26.0	4	P	S, G	A	C, H	S	Tpp	1.0	4,375.87	22.00	.....do..........	....	......	......	
-6bd	Jacob Rothenburger	1938	Dr	118	24	P	S, G	A	T, E	I	Tc	2.0	4,362.18	14.13	May 20, 1947	R1,150	......	240	
-6bd	W. E. Moore........	1940	Dr	96	18	P	S, G	A	T, E	I, O	Hpb	.5	4,371.37	22.21	June 9, 1947	M1,070	22	135	Sca, Eos.
-7ab	......do..............	1947	Dr	98	18	P	S, G	A	T, E	I	Hpb	1.5	4,377.16	25.77	May 21, 1947	R1,200	......	80	Eos.
-7bc	John Bain............	1939	Dr	39.0	4	P	S, G	A	C, W	S	Tc	2.5	4,383.82	32.20	May 24, 1947	....	......	......	S-98.
-8bc	H. F. Tormohlen...	1939	Dr	110	18	P	S, G	A	T, E	I	Idp	1.2	4,377.82	26.18	May 22, 1947	R910	......	190	
-8cc	Frank Timmons.....	1939	Dr	104	18	P	S, G	A	T, E	I	Ls	....	4,382.1	28	....	R1,100	14	135	Eos.
-16bb	S. H. Schoepflin....	......	Du	30	36	C	S	D, A	C, W	N	Tc	0	4,408.76	25.00	May 24, 1947	....	......	......	
-17ab	William Hickman..	......	Dr	29.0	4	P	S	D, A	C, H	N	Tc	1.5	4,388.54	24.49	.....do..........	....	......	......	
-18ad	J. W. Bain..........	1940	Dr	100	18	P	S, G	A	T, E	I	Tc	1.0	4,390.45	36.18	.....do..........	R1,400	16	140	
-18dd	......do..............	1948	Dr	96	18	P	S, G	A	T, E	I	Ls	....	....	35	....	....	......	......	Eos.

-19aa	Karsch brothers.....	1941	Dr	90	18	P	S, G	A	T, E	I	Fs	0	4,400.60	40.10	May 22, 1947	R1,200	......	120	
-20bb	Mr. Frazier..........	....	Dr	39.0	6	P	S, G	A	N	N	Tc	1.0	4,400.16	37.35	May 26, 1947	....	......	......	
-20bc	W. Waltz............	1949	Dr	72	18	P	S, G	A	T, E	I	Hpb	1.5	....	43.54	May 4, 1950	....	......	......	
-20cc	W. F. Lohf	1918	Dr	49.0	6	P	S, G	A	C, W	D, S	Tc	1.5	4,410.33	42.82	May 26, 1947	....	......	......	S-78.
-20cd	......do..............	1950	Dr	84	18	P	S, G	A	T, E	I	Tc	1.5	....	45.81	Apr. 12, 1950	....	......	......	Eos.
-20dc	Glade Stanfield.....	1948	Dr	81	18	P	S, G	A	T, E	I	Hpb	1.0	....	43.35	June 1, 1948	M550	......	160	Eos, Sca, L.
-28cb	J. Roediger..........	....	Dr	....	6	P	S, G	A	C, W	S	Ls	....	....	45	....	....	......	......	
-29aa	Peter Hellmuth.....	1946	Dr	60	5	P	S, G	A	J, E	D	Ls	....	4,413.5	48	....	....	......	......	Eos.
-29ac	......do..............	1947	Dr	76	18	P	S, G	A	T, E	I	Tvp	2.0	4,417.60	47	....	R1,200	13	140	Do.
-29ad	......do..............	1945	Dr	80	18	P	S, G	A	N	O	Tc	.5	4,417.97	46.71	July 14, 1947	R900	25	......	Do.
-29dd1	C. F. Schreiner.....	1945	Dr	73	18	P	S, G	A	T, T	I	Hpb	1.0	4,419.39	46.00	June 5, 1947	M375	17	150	Eos, Sca.
-29dd2	......do..............	1948	Dr	70	18	P	S, G	A	T, E	I	Idp	1.2	4,422.89	47.10	May 17, 1948	R850	18	......	Eos.
-30aa	Ike Cromwell.......	......	Dr	44.0	4	P	S, G	A	C, W	D, S	Tc	2.0	4,407.65	40.00	May 26, 1947	....	......	......	
-30da	Howard Glenn.......	....	Dr	70	4	P	S, G	A	C, W	S, O	Tc	1.5	4,421.58	50.80	.....do..........	....	......	......	Eos.
-31bb	......do..............	....	Dr	58.0	4	P	S	D, A	C, W	S	Tc	1.0	4,447.32	33.53	Mar. 23, 1949	....	......	......	
-32ca1	......do..............	1927	Dr	46	4	P	S, G	A	C, W	D, S	Tc	1.5	4,428.23	45.00	June 6, 1947	....	......	......	S-50.
-32ca2	......do..............	1944	Dr	50	4	P	S, G	A	C, E	S	Tc	1.7	4,428.14	45.80	.....do..........	....	......	......	Eos.
-32da	......do..............	....	Du	47.0	60	C	S, G	A	C, W	D, S, O	Twc	1.0	4,429.89	43.98	June 5, 1947	....	......	......	
-33bc	Holman Porter	1948	Dr	71	18	P	S, G	A	T, E	I	Tc	1.0	4,431.11	48.17	Feb. 2, 1950	R850	16	......	Eos.
-33cd	....	....	Dr	....	18	P	S, G	A	T, D	I	Tc	.4	4,435.60	43.29	Apr. 20, 1949	....	......	......	
B2-58-1db	John Bain............	....	Dr	43.0	3	P	S	D, A	C, W	S	Tc	1.0	4,374.67	17.58	May 24, 1947	....	......	......	
-6bd	....	....	Dr	50	12	P	S, G	A	C, W	D	Tc	1.5	....	10.74	Nov. 18, 1947	....	......	......	L.
-24dc	Mr. Huff............	1948	Dr	50.0	15	P	S	D, A	C, W	S	Tc	4.0	4,421.99	28.75	Mar. 23, 1949	....	......	......	
-34cc	Mrs. R. Johnson	1947	Dr	680	6	P	R	P	C, W	S	Tc	1.0	....	269.52	Nov. 2, 1949	....	......	......	
B2-59-1dd	Mr. Jones............	......	Dr	72.0	18	P	S, G	A	T, D	I	Hpb	.5	....	15.88	Nov. 18, 1947	....	......	......	
-6ac	V. F. Vance........	1943	Dr	138	18	P	S, G	A	T, E	I	Hpb	.4	4,591.25	27.20	.....do..........	M810	29	90	Eos.
-6cc	......do..............	1949	Dr	151.0	18	P	S, G	A	T, E	I	Tc	.5	....	40.65	Nov. 28, 1949	R800	40	140	Do.
-7ac	Bradley & Linder-holm.	....	Dr	135	18	P	S, G	A	T, E	I	Hpb	0	4,604.79	33.20	Nov. 18, 1947	M1,090	......	200	Do.
-7cc	J. M. Maddox.......	1948	Dr	158	18	P	S, G	A	T, E	I	Hpb	.5	4,615.57	41.65	Mar. 3, 1948	M1,000	25	......	Do.
-7dc	O. R. Minch........	1937	Dr	140	24	P	S, G	A	T, E	I	Tpp	.5	4,608.06	31.70	Nov. 20, 1947	M300	......	74	Do.
-8cd	Bradley & Linder-holm.	1950	Dr	160	18	P	S, G	A	T, E	I	Hpb	1.0	....	32.05	May 8, 1950	R1,650	40	220	Do.
-18ab	......do..............	1948	Dr	142	18	P	S, G	A	T, E	I	Hpb	.5	....	34.64	Oct. 21, 1948	M570	17	......	
-18ac	......do..............	1947	Dr	146	18	P	S, G	A	T, E	I	Hpb	0	4,616.27	33.85	Nov. 24, 1947	M580	24	160	Eos.
-18bc	J. W. Maddox......	1940	Dr	159	18	P	S, G	A	T, E	I	Tvp	.8	4,620.00	44.31	June 23, 1948	R600	......	150	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B2-59-18cd	C. A. Bresnahan...	1938	Dr	160	18	P	S, G	A	T, E	I	Tc	0	4,622.63	34.75	Nov. 20, 1947	R700	......	190	
-19bc	W. E. Richardson..	1945	Dr	136	18	P	S, G	A	T, E	I	Hpb	1.0	4,633.37	39.46	Nov. 24, 1947	M760	41	140	Eos.
-19cc	......do..............	......	Dr	143	18	P	S, G	A	T, E	I	Bpb	1.0	4,646.10	44.80	.....do..........	M880	36	130	Do.
-20ac	C. A. Segalke.....	1945	Dr	127	18	P	S, G	A	T, D	I	Tc	1.0	....	30.55	Nov. 8, 1949	R1,400	30	......	Do.
-20cd1	W. E. Richardson.	1946	Dr	147	18	P	S, G	A	T, E	I	Hpb	1.0	4,641.48	33.18	Nov. 24, 1947	M760	41	140	Do.
-20cd2	......do..............	1938	Dr	140	24	P	S, G	A	T, E	I	Tpp	0	4,640.64	32.98	.....do..........	M520	......	170	
-21cc	Harry Shoemaker..	1948	Dr	118	6	P	S, G	A	T, E	D	Tc	-6.0	4,641.25	26.30	Mar. 28, 1949	....	......	......	
-29bc	Dale Richardson...	1946	Dr	136	18	P	S, G	A	T, E	I	Hpb	.8	4,649.92	35.86	Nov. 24, 1947	M735	......	150	Eos.
-29cc	James Patterson....	1940	Dr	140	......	P	S, G	A	T, E	I	Bpb	0	4,654.47	35.28	.....do..........	M800	......	150	
-30cc	Mr. Van Meter.....	1949	Dr	....	18	P	S, G	A	T, D	I	Hpb	0	....	51.35	Sept. 26, 1949	M785	17	......	
-30dc	A. L. Richardson..	1945	Dr	138	18	P	S, G	A	T, E	I	Hpb	.5	4,657.81	40.29	Nov. 24, 1947	M725	38	200	Eos.
-31ac	G. Kammerzell....	1944	Dr	140	18	P	S, G	A	T, E	I	Hpb	.5	....	40.80	.....do..........	M700	......	160	
-31dc1	H. Kammerzell....	1947	Dr	140	18	P	S, G	A	T, E	I	Hpb	.6	4,673.33	37.70	.....do..........	M670	40	160	Eos.
-31dc2	George Kammerzell	1948	Dr	140.0	18	P	S, G	A	T, E	I	Hpb	1.5	....	41.90	Apr. 29, 1948	....	......	......	S-145.
-32cc1	F. Otteson..........	1942	Dr	140	18	P	S, G	A	T, E	I	Ls	......	4,669.7	29	....	M445	......	115	L.
-32cc2	......do..............	1939	Dr	136	4	P	S, G	A	C, W	S	Ls	......	4,670.0	29	....	....	......	......	Eos, Sca.
-32cc3	......do..............	1942	Dr	136	4	P	S, G	A	J, E	D	Ls	......	4,669.5	29	....	....	......	......	Do.
-34cc	....	......	Du	....	36	C	S, G	D, A	C, H	D, S	Tc	1.5	4,678.19	30.30	Apr. 19, 1948	....	......	......	
B2-60-1bd1	John Meyers.........	1942	Dr	172	18	P	S, G	A	T, E	I	Hpb	.6	4,604.02	58.44	Nov. 18, 1947	M675	25	160	L
-1bd2	......do..............	1945	Dr	170	18	P	S, G	A	T, E	I	Ls	......	4,601.8	....	....	M1,030	......	160	

-1dc	E. Weller......	......	Dr	140	18	P	S, G	A	T, E	I	Hpb	.7	4, 611.51	55.58	Nov. 18, 1947	M1,050	......	120	Eos.
-3cc	Stanley Morton.....	1948	Dr	105	18	P	S, G	A	T, D	I	Tc	.5	......	57.38	Sept. 15, 1948	R1,000	......	80	Do.
-4dd	William Reck......	1944	Dr	80	18	P	S, G	A	T, E	I, O	Hpb	.5	4, 603.89	56.59	Nov. 4, 1947	......	......	......	L.
-6bb	Alkire brothers......	1942	Dr	80	18	P	S, G	A	T, E	I	Fs	1.0	4, 615.27	28.50	Dec. 22, 1947	R1,200	......	140	
-6dc	......do......	1942	Dr	80	18	P	S, G	A	T, E	I	Tpp	1.5	4, 625.09	30.02	......do......	R1,000	......	140	
-10cc1	Henry Misner......	1937	Dr	99	24	P	S, G	A	N	O	Tc	0	4, 615.71	57.68	Aug. 26, 1947	......	......	......	
-10cc2	......do......	1942	Dr	......	18	P	S, G	A	T, E	I	Hc	.5	4, 616.14	56.90	Sept. 19, 1947	R1,100	......	......	
-11dd	R. A. Baer......	1948	Dr	116	18	P	S, G	A	T, E	I	Tc	2.5	......	51.50	Apr. 27, 1948	R1,000	25	......	Eos.
-12dc	William Maddox...	1946	Dr	150	18	P	S, G	A	T, E	I	Tvp	.5	4, 620.70	57.27	Nov. 7, 1949	M700	42	160	
-13cb	William Frank......	1948	Dr	124	18	P	S, G	A	T, E	I	Hpb	1.0	......	59.48	July 21, 1948	M640	25	......	S-136.
-13cc	......	1942	Dr	115	18	P	S, G	A	T, E	I	Bpb	1.0	4, 632.27	50.84	Dec. 16, 1947	M630	32	150	
-13dd	C. A. Bresnahan....	1938	Dr	185	24	P	S, G	A	T, E	I, O	Hpb	.4	4, 634.00	50.95	Oct. 2, 1947	M855	32	......	
-14dd	Oscar Baer......	1936	Dr	114	16	P	S, G	A	T, E	I	Ls	......	4, 633.5	45	......	M690	......	130	Eos.
-16da	Mr. Patton......	1948	Dr	67.5	6	P	S, G	A	C, W	S	Tc	1.5	4, 625.10	56.22	Mar. 18, 1948	......	......	......	
-21ad	......	......	Dr	......	6	P	S, G	A	N	O	Tc	1.0	4, 652.36	63.48	......do......	......	......	......	
-22dd	F. Otteson......	1946	Dr	......	18	P	S, G	A	T, E	I	Fs	.6	4, 643.97	52.15	Dec. 16, 1947	M375	42	100	
-23dc	C. E. Reed......	1936	Dr	118	16	P	S, G	A	T, E	I	Tc	1.0	4, 650.14	60.22	Nov. 4, 1949	M710	......	140	
-23dd	......do......	1949	Dr	......	......	P	S, G	A	T, E	I	......	......	......	......	......	......	......	......	
-24cc1	Albert Clough......	1940	Dr	131	21	P	S, G	A	T, E	I	Ls	......	4, 647.4	53	......	R1,030	......	160	
-24cc2	......do......	1946	Dr	130	18	P	S, G	A	T, E	I	Hc	.5	4, 647.61	53.35	Dec. 15, 1947	M1,090	......	160	Eos.
-25ac	F. G. Viets......	1945	Dr	138	......	P	S, G	A	T, E	I	Bpb	.5	......	50.08	......do......	M710	33	140	
-25bc	F. B. Neff......	......	Dr	120	18	P	S, G	A	T, E	I	Hpb	.5	4, 653.72	53.05	Dec. 16, 1947	M630	12	80	
-25cc	F. G. Viets......	1938	Dr	143	24	P	S, G	A	T, E	I	Bpb	1.0	4, 664.24	56.42	Dec. 15, 1947	M810	34	160	Eos.
-25da	......do......	1932	Dr	58.0	6	P	S, G	A	C, W	S, O	Tc	1.5	4, 658.25	46.49	July 17, 1947	......	......	......	
-25dc	......do......	1944	Dr	138	......	P	S, G	A	T, D	I	Hpb	1.0	4, 666.00	54.00	Dec. 15, 1947	M610	30	140	Eos.
-26ac1	M. J. White......	1946	Dr	120	18	P	S, G	A	T, E	I	Bpb	.5	4, 658.24	59.58	Dec. 16, 1947	M590	20	70	Do.
-26ac2	......do......	1933	Dr	120	15	P	S, G	A	T, E	I	Ls	......	4, 657.6	......	......	R590	......	60	Do.
-26bd	Kenneth Reed......	1945	Dr	115	......	P	S, G	A	T, E	I	Hpb	1.2	4, 657.33	59.67	Dec. 16, 1947	R1,100	......	130	Eos, L.
-26cc	Charles Osborn......	1937	Dr	118	24	P	S, G	A	T, E	I	Tc	0	......	65.24	Apr. 29, 1948	R500	......	110	
-26cd	......do......	1945	Dr	119	18	P	S, G	A	T, E	I	Hpb	1.2	4, 664.24	61.87	Dec. 16, 1947	R500	20	60	Eos.
-26dd	R. A. Baer......	1936	Dr	125	16	P	S, G	A	T, E	I, O	Hpb	1.0	4, 665.21	67.68	Oct. 3, 1947	M765	......	......	
-27bd1	James Lane......	1949	Dr	77	16	P	S, G	A	T, E	I	Tc	0	......	56.65	Nov. 4, 1949	......	......	......	Eos.
-27bd2	......do......	1949	Dr	78	12	P	S, G	A	T, E	I	Tc	0	......	57.24	......do......	......	......	......	Do.
-27cd	Charles Bonfils......	1940	Dr	70	24	P	S, G	A	T, E	I	Ls	......	4, 660.0	......	......	R250	......	......	Do.
-33aa1	E. Morehead......	......	Dr	......	6	P	R	L	C, W	S	Tc	.5	......	110.00	Mar. 18, 1948	......	......	......	
-33aa2	......do......	......	Dr	......	6	P	S, R	D, L	C, H	S	Tc	1.5	4, 703.47	59.10	Apr. 15, 1949	......	......	......	
-33da	......	......	Dr	......	6	P	R	L	N	N	Tc	1.0	4, 738.46	102.55	Mar. 18, 1949	......	......	......	
-34da	Mr. Hackley......	......	Dr	......	24	P	S, G	A	N	N	Tc	1.0	4, 674.03	56.00	Dec. 18, 1947	......	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B2-60-35ac	P. A. Wells......	......	Dr	......	24	P	S,G	A	T,E	I	Tc	0.5	4,671.64	60.65	Dec. 18, 1947	R800	......	......	
-35bd1	Mr. Adler......	......	Dr	......	24	P	S,G	A	T,E	I	Hc	.6	4,673.89	62.59	......do......	M310	......	......	
-35bd2	Mr. Hackley......	......	Dr	......	18	P	S,G	A	T,E	I	Hpb	.7	4,673.54	62.52	......do......	M675	20	140	
-35cd	Cecil Osborn......	1943	Dr	90	18	P	S,G	A	T,E	I	Hpb	.7	4,681.60	52.09	......do......	M230	......	100	Eos.
-36ac	Col. Judson......	1937	Dr	123	18	P	S,G	A	T,E	I	Fs	0	4,668.80	50.04	Nov. 25, 1947	M790	38	160	
-36bc	.....do......	1937	Dr	......	......	P	S,G	A	T,E	I	Hpb	0	4,666.80	63.18	Dec. 18, 1947	M570	21	160	
-36cb	Bigler & Harshman.	......	Dr	123	18	P	S,G	A	T,E	I	......	......	......	......	......	M580	......	100	
-36dc	.....do......	1934	Dr	128	18	P	S,G	A	T,E	I	Bpb	0	4,679.25	55.84	Nov. 24, 1947	M730	22	160	
B3-55-8ac	John Fries......	......	Dr	......	6	P	R	P	C,W	S	Tc	1.0	4,361.01	55.50	Dec. 13, 1948	......	......	......	S-53.
-17ad	.....do......	......	Dr	53	6	P	S	D	C,W	S	Tc	1.0	4,392.19	48.47	......do......	......	......	......	Eos.
-30cc	Max Peterson......	......	Dr	43.0	......	P	S,G, R	D, A, P	C,H	D	Tc	0	4,321.18	20.00	Aug. 11, 1947	......	......	......	
-30dc	Mr. Bass......	......	Dr	63	12	P	S,R	D,P	C,W	S	Tc	0	4,397.94	23.82	Mar. 28, 1948	......	......	......	
B3-56-1ad	Mr. Campbell......	1942	Dr	164	6	P	S,R	D,P	C,W	D,S	Ls	......	......	54	......	......	46	......	
-2aa	Great Western Sugar Co.	1943	Dr	56	18	P	S,G	A	T,E	In	Ls	......	......	8	......	R500	......	......	Eos.
-2cc	Lloyd Mitchell......	1938	Dr	80	......	P	S,G	A	T,E	I	Hpb	1.6	4,238.62	12.80	July 16, 1947	M737	23	80	Do.
-3aa	Town of Brush......	1937	Dr	99.5	12	P	S,G	A	T,E	P	Bpb	-2.0	4,234.53	18.55	July 30, 1947	R500	7	......	
-3ad	.....do......	1941	Dr	95	12	P	S,G	A	T,E	P	Bpb	-6.4	4,226.00	......	......	......	......	......	
-3da	.....do......	......	Dr	85	......	P	S,G	A	T,E	P	Ls	......	4,231.9	18	......	......	......	......	Eos, Sca, L.

-5bc	Carl Johnson........	1933	Dr	85	14	P	S, G	A	T, E	I	Ls	....	4, 258.1	27	....	R1,200	......	......	L.
-6cb	Harold Stitt.........	1945	Dr	108	24	P	S, G	A	T, E	I	Tc	1.0	4, 267.91	31.30	July 15, 1947	R1,600	7	320	
-7bc	C. M. Stitt.........	1938	Dr	96	24	P	S, G	A	T, E	I	Ls	....	4, 270.3	30	....	R1,300	14	300	
-7cb	Jacob Lenhart.......	1934	Dr	96	16	P	S, G	A	T, G	I, O	Bpb	0	4, 274.06	29.40	July 15, 1947	R1,000	20	280	Eos.
-8bc	Harvy Bollinger....	1937	Dr	90	24	P	S, G	A	T, E	I	Hpb	-1.6	4, 259.27	19.30	......do..........	R1,200	......	320	
-8db	Peter Peterson......	1940	Dr	192	......	P	S, G	A	T, E	I	Bpb	.4	4, 262.39	20.20	......do..........	....	40	240	Eos.
-10dc	E. D. Ray...........	1941	Dr	83	18	P	S, G	A	T, E	I	Tc	2.0	....	7.35	July 16, 1947	R1,600	15	......	Do.
-11ba	C. Schweikhardt ...	1944	Dr	62	......	P	S, G	A	T, E	I	Bpb	1.2	4, 238.32	11.15	July 15, 1947	....	......	30	Do.
-11dc	M. M. Mitchell...	1941	Dr	75	......	P	S, G	A	T, E	I	Ls	....	4, 252.5	....	....	M760	25	......	
-11dd	....	......	Dr	......	6	P	S, G	A	C, W	D	Tc	.5	....	12.15	Mar. 24, 1948	....	......	......	
-12bc	I. Christensen......	......	Dr	....	6	P	S, G	A	C, W	S	Ls	....	4, 290.2	45	....	....	......	......	Sca.
-12da	Brush Golf Club....	......	Dr	60	6	P	S, R	P, D	C, H	D	Tpp	1.0	4, 354.03	33.64	May 12, 1949	....	......	......	
-14ba	Mitchell & Needham.	1937	Dr	80	......	P	S, G	A	T, E	I	Hpb	1.0	4, 258.34	16.50	Oct. 29, 1947	M620	12	......	
-14cc	Emil Bruchez........	1947	Dr	92	18	P	S, G	A	T, E	I	Tc	2.6	4, 262.64	14.53	Oct. 2, 1947	M1,450	29	140	Eos, Sca.
-14dc	C. Henry............	1949	Dr	......	18	P	S, G	A	T, E	I	Hpb	1.0	....	11.65	July 12, 1947	....	......	......	
-15dd	Gilbert French......	......	Dr	85	6	P	S, G	A	C, W	S, O	Tc	.8	....	12.82	Mar. 24, 1948	....	......	......	Eos.
-21cc	Max Peterson.......	1949	Dr	......	6	P	S, G	A	N	N	Tc	1.0	4, 290.00	15.52	Mar. 4, 1949	....	......	......	
-22ab	George Twombly..	1948	Dr	85	6	P	S, G	A, D	C, H	N	Tc	0	4, 264.15	13.56	Sept. 8, 1948	....	......	......	Sca, Eos.
-22da	C. B. & Q RR. Co.	1939	Dr	83	24	P	S, G	A, D	T, E	In	Hpb	1.0	4, 266.90	6.00	Sept. 7, 1948	R150	15	......	Sca.
-22dc	George Twombly..	......	Dr	17.5	6	P	S, G	A	C, W	S	Tc	1.0	4, 272.02	3.42	Mar. 2, 1949	....	......	......	
-23ac	Crismer brothers...	1938	Dr	91	24	P	S, G	A	T, E	I	Tc	1.0	....	16.50	Oct. 29, 1947	M1,250	30	113	Eos.
-24bb	C. Henry............	1907	DD	54	14	P	S, G	A	H, E	I, O	Tc	-7.0	4, 247.30	0	July 18, 1947	R1,200	17	......	
-24bd	Mr. Mueller.........	1948	Dr	48	18	P	S, G	A	T, T	I	Tvp	1.5	....	14.84	Mar. 24, 1948	M430	15	......	L.
-24cc	O. G. Lewis.........	1937	Dr	50	24	P	S, G	A	T, E	I	Tc	0	4, 273.28	12.79	Oct. 2, 1947	M665	24	100	
-25db	C. Kast..............	1940	Dr	43	18	P	S, G	A	T, E	I	Tc	2.7	4, 277.90	9.55	July 17, 1947	M730	17	80	S-46.
-26ad	J. S. Livingston.....	1943	Dr	80	18	P	S, G	A	T, E	I	Hpb	0	4, 279.11	14.30	......do..........	R1,200	10	100	Eos.
-26bb	Town of Brush.......	1950	Dr	112	18	P	S, G	A, D	T, E	P	Hpb	1.3	4, 301.3	25.96	Nov. 27, 1950	M699	21	......	Sca, Pt, Eos.
-30ab	Max Peterson........	......	Dr	75.0	6	P	S	S	N	N	Tc	1.0	4, 362.0	58.00	Mar. 3, 1949	....	......	......	
-30bc	Lee brothers.........	......	Dr	63.0	6	P	S	D	N	N	Tc	1.5	4, 406.45	59.70	.....do..........	....	......	......	
-31bb	....	......	Dr	......	18	P	S	D	N	N	Tc	1.8	4, 429.50	35.15	Mar. 4, 1949	....	......	......	
-36ad	Max Peterson........	......	Dr	27.1	6	P	S, G	A	C, W	S	Tc	0	4, 314.38	19.50	Aug. 11, 1947	....	......	......	
-36dc	.....do................	1937	Dr	37	24	P	S, G	A	T, E	I	Tc	1.2	4, 288.78	15.80	July 17, 1947	R400	......	25	Eos.
-36dd	.....do................	1938	Dr	37	18	P	S, G	A	T, E	I	Ls	....	4, 288.3	16	....	R300	......	25	Eos.
B3-57-1ad	Lindell & Oswald...	1935	Dr	108	16	P	S, G	A	T, E	I	Hpb	.8	4, 269.90	34.20	June 23, 1947	R1,020	9	320	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Morgan County, Colo.—Continued																		
B3-57-1cc	J. C. Parker	1935	Dr	123	16	P	S,G	A	T,E	I	Fs	0	......	33.26	Nov. 18, 1949	R1,040	10	136	
-2ac	R. B. Graham	1932	Dr	95	16	P	S,G	A	T,E	I	Hpb	1.0	4,276.88	34.30	June 20, 1947	R1,350	......	320	
-2bb	O. R. Preedy	1946	Dr	114	......	P	S,G	A	T,E	I	Ls	......	......	38	......	R1,550	8	100	
-2cc	Bauer & Frick	1947	Dr	100	18	P	S,G	A	T,E	I	Fs	.4	4,285.86	34.70	June 18, 1947	R2,000	7	250	
-3ad	Adams & Schumaker	1947	Dr	110	18	P	S,G	A	T,E	I	Hpb	1.8	4,284.07	36.80	June 20, 1947	R1,600	......	186	
-3cc1	Philip Schwindt	1935	Dr	100	14	P	S,G	A	T,E	I	Tvp	.7	4,295.00	38.60	June 18, 1947	R750	......	80	
-3cc2	C. E. Graves	1937	Dr	121	16	P	S,G	A	T,E	I	Ls	......	4,296.2	40	......	R1,120	7	200	
-3db	J. H. Roediger	1936	Dr	120	20	P	S,G	A	T,E	I	Hpb	.4	4,285.82	45.40	June 23, 1947	R1,600	8	220	
-4bc	Ray Barlow	1930	Dr	90	......	P	S,G	A	T,E	I	Ls	......	......	30	......	R1,000	7	280	
-4bd	J. R. Sergeant	1912	Dr	110	12	P	S,G	A	N	N	Ls	......	......	45	......	......	......	......	
-5cc	Mrs. W. E. Warner	1940	Dr	122	18	P	S,G	A	T,E	I	Ls	......	......	40	......	R1,540	......	240	
-5da	Barkley, Work, & Fiebig.	1934	Dr	102	16	P	S,G	A	T,E	I	Ls	......	......	44	......	R1,500	10	300	
-6ac	City of Fort Morgan	1939	Dr	189	18	P	S,G	A	T,E	P	Ls	......	4,320.0	46	......	......	......	......	Eos.
-6bd	......do	1943	Dr	175	18	P	S,G	A	T,E	P	Hpb	.6	4,324.01	46.74	Feb. 20, 1948	R1,300	14	......	Sca, S-226.
-6cd	......do	1949	Dr	179	18	P	S,G	A	T,E	P	Ls	......	......	48	......	R1,250	11	......	Eos.
-6db	......do	1935	Dr	250	18	P	S,G	A	T,E	P	Hpb	.5	4,323.09	47.53	Feb. 20, 1948	R900	9	......	
-6dc	......do	1906	DD	180	15	P	S,G	A	N	O	Twc	-5.0	4,320.58	38.60	Nov. 20, 1947	......	......	......	Ari, Eos.
-7cc	Fred Kembel	1937	Dr	140	16	P	S,G	A	T,E	I,O	Bpb	.8	4,340.89	49.40	May 8, 1947	M1,030	11	176	
-8bc	Murchy, Johnston, & Groves.	1934	Dr	106	16	P	S,G	A	T,E	I	Idp	.5	4,325.66	43.38	June 13, 1947	R1,320	16	300	

-9bc	Edward Selander....	1936	Dr	110	.....	P	S, G	A	T, E	I	Tvp	.8	4,307.86	39.25	June 16, 1947	R1,000	......	120	
-9bd	Kautman & Townsend.	......	Dr	120	.....	P	S, G	A	T, E	I	Hpb	1.5	....	37.30	......do.........	R1,600	......	160	
-10ba	Duncan & Bauer.....	1935	Dr	108	16	P	S, G	A	T, E	I	Hpb	1.1	4,295.53	36.00	June 18, 1947	R1,100	8	200	
-10cc	J. O. Ireland........	1938	Dr	70	.....	P	S, G	A	T, E	I	Hpb	.5	4,309.80	43.80	June 16, 1947	R250	......	108	
-11ab	Mr. Stump............	1937	Dr	....	.....	P	S, G	A	T, E	I	Idp	0	....	29.21	Nov. 18, 1947	....	......	120	
-11ac	O. G. Graham.......	1933	Dr	120	.....	P	S, G	A	T, E	I	Tvp	.7	....	30.20	June 19, 1947	R1,250	......	215	
-12ac	J. H. Roediger......	1940	Dr	102	18	P	S, G	A	T, E	I	Bpb	.3	4,276.63	33.20	......do.........	R1,600	......	320	Eos.
-12cc	Jacob Bath...........	1940	Dr	107	18	P	S, G	A	T, E	I	Bpb	.4	4,284.00	33.00	......do.........	R1,500	......	160	Do.
-13ca	John Lee...............	......	Dr	35	6	P	S, G	D, A	C, W	D, S	Tc	.5	4,323.30	14.35	......do.........	....	......	......	
-14bb	Henry Giese..........	1940	Dr	102	18	P	S, G	A	T, E	I	Bpb	1.5	4,300.21	34.10	......do.........	....	......	320	
-15ab	Henry Lenhardt......	1936	Dr	113	18	P	S, G	A	T, E	I	Tvp	.9	4,304.50	38.30	June 18, 1947	R1,450	......	160	
-15cb	J. Trumbo..............	......	Dr	33.5	6	P	S, G	A	C, W	S	Tc	1.0	....	30.60	Apr. 1, 1948	....	......	......	
-16aa	......do.................	......	Dr	....	4	P	S, G	A	N	O	Tvp	0	4,311.57	40.00	June 16, 1947	....	......	......	
-16cc	Lapp & Chase........	1939	Dr	108	18	P	S, G	A	T	I	Idp	1.9	4,320.75	32.65	June 13, 1947	R1,525	......	320	
-17ab	J. H. Roediger......	1947	Dr	50.0	5	P	S, G	A	T, E	D	Ls	......	4,321.6	40.10	Aug. 22, 1947	....	......	......	
-17ac	......do.................	1941	Dr	120	.....	P	S, G	A	T, E	I	Idp	1.2	....	39.45	June 16, 1947	R1,750	10	310	Eos.
-17dc	Vern Young..........	......	Dr	90	18	P	S, G	A	T, E	I	Idp	1.8	4,324.67	34.65	June 13, 1947	R850	......	80	
-18ab	Kammerer Estate....	1940	Dr	191	18	P	S, G	A	T, E	I	Fs	1.5	4,332.00	45.10	May 19, 1947	R1,600	8	160	
-18bc	George I. Neal......	1944	Dr	173.0	18	P	S, G	A	T, E	I	Hpb	0	4,343.83	50.42	May 14, 1947	R1,600	8	180	
-18cc	H. J. Schluntz.........	......	Dr	150	18	P	S, G	A	T, E	I	Fs	1.0	4,343.37	41.30	May 8, 1947	M770	......	160	
-18cd	......do.................	1947	Dr	118.6	4	P	S, G	A	C, H	D	Ls	......	4,332.8	45.50	Apr. 15, 1947	....	......	......	
-18dc	Joseph Weber.........	1946	Dr	160	18	P	S, G	A	T, E	I	Fs	.7	4,334.65	37.69	May 15, 1947	M1,160	29	80	Eos.
-19ac	W. J. Peyton.........	1937	Dr	143	18	P	S, G	A	T, E	I	Fs	.8	4,339.16	26.00	May 19, 1947	R780	......	177	
-19bb	Weisbart & Co.......	1938	Dr	170	18	P	S, G	A	N	O	Tpp	1.5	4,345.17	42.00	May 20, 1947	....	......	......	Eos, Ari.
-19ca	H. Weisbart..........	1944	Dr	180	18	P	S, G	A	T, E	I	Fs	.8	4,343.02	25.90	May 19, 1947	R1,500	......	240	
-19cc	Fred Weimer..........	1941	Dr	....	.....	P	S, G	A	T, E	I	Ls	......	4,344.3	......	....	....	......	80	
-19db1	J. Barkley.............	1937	Dr	150	16	P	S, G	A	T, E	I	Hpb	1.6	4,340.76	22.37	May 19, 1947	R1,100	50	146	
-19db2	......do.................	1947	Dr	142.0	18	P	S, G	A	T, E	I	Tc	.3	4,339.12	18.54	Dec. 30, 1947	....	......	......	S-150.
-20bb	Roediger & Barkley.	1939	Dr	92.0	18	P	S, G	A	T, E	I	Tpp	1.3	4,334.64	30.63	May 19, 1947	R1,300	45	190	
-20cc	Barkley, Scheidt, & Good.	1935	Dr	108	16	P	S, G	A	T, E	I	Bpb	.6	4,335.41	13.60	......do.........	R1,250	50	280	S-112.
-20db	Kemmerer Estate....	1939	Dr	107	18	P	S, G	A	T, E	I	......	......	....	......	....	R1,000	8	196	
-21aa	Henry Schwindt, Sr..	......	Dr	107	6	P	S, G	A	C, W	S, D	Tpc	0	4,315.51	23.60	June 16, 1947	....	......	......	
-21ad	J. L. Fuqua..........	1947	Dr	80	5	P	S, G	A	J, E	D	Ls	......	....	17	....	....	......	......	
-22ab	J. P. Currey Estate..	......	Dr	70	5	P	S	A	C, H	D, S	Ls	......	....	15	....	....	......	......	
-27cc	R. F. Billings.......	......	Dr	......	.....	P	S	D	C, W	S	Tc	1.5	4,398.33	39.60	June 17, 1947	....	......	......	
-29ab	John Guenther.......	......	Dr	74	.....	P	S, G	A	T, E	D	Ls	......	....	9	....	....	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska— Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
										Morgan County, Colo. —Continued									
B3-57-29ac	John Guenther....	1947	Dr	85	18	P	S, G	A	T, E	I	Tc	-1.0	....	9.40	June 17, 1947	R1,200	......	220	Eos.
-29bc	Arthur Rehkop...	1944	Dr	100	18	P	S, G	A	T, E	I	Fs	.5	4,339.97	9.38	May 16, 1947	R1,350	46	160	Do.
-29cc	Henry Grezfeld...	1935	Dr	100	16	P	S, G	A	T, E	I	Tc	-1.0	4,345.13	9.50	......do.........	R950	......	143	
-29dd	John Logan........	......	Dr	......	......	P	S, G	A	C, W	D	Ls	....	4,342.5	9	....	....	......	....	
-30ab	H. W. Clatworthy.	1939	Dr	146	18	P	S, G	A	T, E	I	Hpb	.5	4,339.59	15.79	May 19, 1947	R1,050	......	120	Eos.
-30bb	Gelroth & Hanna.	1938	Dr	121	18	P	S, G	A	T, E	I, O	Bpb	1.5	4,347.02	15.45	May 20, 1947	M800	35	160	Eos, Sca.
-31ba	Harry Luhrs........	1940	Dr	125	22	P	S, G	A	T, E	I	Fs	1.0	4,348.41	9.60	May 17, 1947	R1,250	36	200	Eos
-32cc	Galassini & Moore	1940	Dr	102	16	P	S, G	A	T, E	I	Tc	.3	4,357.10	9.95	May 21, 1947	M1,390	40	400	Do.
B3-58-1ab	T. B. Park........	1940	Dr	123	18	P	S, G	A	T, E	I	Ls	....	....	42	....	R1,400	......	115	
-1bc	L. E. Keagy......	1935	Dr	118	16	P	S, G	A	T, E	I	Hpb	0	4,342.30	46.64	Oct. 14, 1947	R1,050	12	160	
-1cc	Hutchinson & Work.	1945	Dr	149	18	P	S, G	A	T, E	I	Tc	1.0	4,347.93	48.62	Dec. 4, 1947	R1,400	2	144	Eos.
-1da1	City of Fort Morgan.	1932	Dr	250	18	P	S, G	A	T, E	P	Hpb	-5.5	....	44.68	Feb. 20, 1948	R900	12	....	S-254.
-1da2	......do.............	1932	Dr	242	18	P	S, G	A	T, E	P	Ls	....	....	50	....	R1,100	10	....	L.
-1dc	Thomas Cooper..	1932	Dr	113	14	P	S, G	A	T, E	I	Ls	....	4,338.3	50	....	R1,257	......	60	
-1dd	L. L. Canfield...	1934	Dr	120	6	P	S, G	A	J, E	D	Ls	....	....	50	....	....	......	....	Sca, S-238.
-2ac	MacCreary Estate	1937	Dr	140	18	P	S, G	A	T, E	I	Hpb	1.0	4,350.50	47.27	Dec. 2, 1947	R1,300	20	153	
-2bc1	R. M. Hough......	1935	Dr	120	16	P	S, G	A	T, E	I	Hpb	1.2	4,355.59	45.77	Nov. 3, 1947	R1,200	......	150	Sca.
-2bc2	......do.............	1947	Dr	122.0	18	P	S, G	A	T, E	I	Tc	.5	4,354.56	45.20	......do.........	R1,400	......	....	

-2dc	Thomas Cooper..	1935	Dr	150	16	P	S, G	A	T, E	I	Ls	....	....	50	....	R1,370	7	142	Eos.
-3ba	L. H. Dierdorff....	1942	Dr	147	18	P	S, G	A	T, E	I	Tc	1.0	4,370.69	56.16	Dec. 1, 1947	R1,590	6	160	Eos, Sca, Pt.
-3cb	R. B. Graham....	1940	Dr	178	18	P	S, G	A	N	O	Tc	1.5	4,368.48	48.25	Dec. 4, 1947	....	......	....	Ari.
-3dc	Alex Winter.......	1942	Dr	......	18	P	S, G	A	T, E	I	Hpb	0	4,364.75	46.97	......do.........	....	......	....	
-4db	Henry Brandt......	1945	Dr	120	18	P	S, G	A	T, E	I	Ls	....	....	60	....	....	......	80	
-4dc	H. G. Sagel......	1940	Dr	170	18	P	S, G	A	T, E	I	Fs	1.0	4,388.82	51.60	Nov. 21, 1949	R1,200	......	80	
-6dd	M. R. Harris.....	......	Dr	29.0	5	P	S, G	A	C, W	S	Tc	1.0	4,371.86	24.05	Dec. 5, 1947	....	......	....	
-8cb	H. W. Clatworthy.	1937	Dr	146	18	P	S, G	A	N	O	Tc	0	4,407.81	50.78	July 9, 1947	....	......	....	S-163.
-9ab	R. B. Graham, Jr..	1940	Dr	180	18	P	S, G	A	T, E	I	Hpb	2.0	4,388.92	53.19	Dec. 4, 1947	R1,200	......	215	Eos.
-9bb	S. B. Stephens...	1947	Dr	120	4	P	S, G	A	T, E	D, S	Ls	....	4,397.9	60	....	....	......	....	
-9dc	Evelyn Knight....	1938	Dr	180	18	P	S, G	A	T, E	I	Hpb	1.5	4,392.91	59.83	Dec. 5, 1947	M825	27	160	
-10bc	J. A. M. Crouch..	1941	Dr	190	16	P	S, G	A	T, E	I	Hpb	1.0	4,378.42	55.70	Oct. 1, 1947	M1,575	10	186	
-10cb	Jacob Kosman....	1944	Dr	200	18	P	S, G	A	T, E	I	Hpb	1.0	4,384.52	57.90	Dec. 6, 1947	R1,150	......	160	L.
-10dc	L. C. Solt.......	1936	Dr	156	18	P	S, G	A	T, E	I	Hpb	.5	4,376.19	56.08	Dec. 5, 1947	R1,100	......	145	Eos.
-11bb	Thomas Cooper..	1943	Dr	......	......	P	S, G	A	T, E	I	Fs	2.0	4,361.83	52.35	Oct. 1, 1947	....	......	....	
-11bc	Alix Stark.......	......	Dr	145	16	P	S, G	A	T, E	I, O	Tc	.8	4,367.03	57.70	......do.........	R1,130	14	120	Eos.
-11cc	Dan Sheppard.....	1936	Dr	150	24	P	S, G	A	T, E	I	Idp	2.0	4,369.34	59.30	Sept. 4, 1947	R970	......	160	
-12ac	Fred Sussex.......	1947	Dr	119.0	18	P	S, G	A	T, E	I	Tc	1.5	4,344.42	51.20	May 9, 1947	R1,300	......	160	
-12bb	Elmer Hein.......	1917	Dr	135	24	P	S, G	A	T, E	I	Bpb	0	4,349.39	50.10	Dec. 3, 1947	R1,070	......	140	
-12cd1	J. P. Curry.......	1935	Dr	150	18	P	S, G	A	T, E	I	Bpb	0	4,352.28	51.89	May 9, 1947	R1,200	21	160	
-12cd2	......do............	......	Dr	132.0	16	P	S, G	A	N	O	Tc	.5	4,352.40	52.01	.....do.........	....	......	....	
-13ac	Harry Epstein.....	1937	Dr	155	24	P	S, G	A	T, E	I	Hpb	1.0	4,349.63	55.23	Sept. 4, 1947	R1,500	......	220	
-13bc	H. J. Amen.......	1947	Dr	145	18	P	S, G	A	T, E	I	Hpb	2.0	4,356.70	55.56	......do.........	R1,300	......	160	Eos.
-13cb1	Henry Gritzfeld...	1945	Dr	190	18	P	S, G	A	T, E	I	Tc	1.0	4,360.13	56.00	Aug. 20, 1947	M955	......	153	Do.
-13cb2	......do............	1945	Dr	190	18	P	S, G	A	N	O	Tc	1.0	4,360.13	56.00	.....do.........	....	......	....	Do.
-14ac	John Kroskob......	1945	Dr	184	18	P	S, G	A	T, E	I	Hpb	2.0	4,362.50	57.89	Sept. 4, 1947	M550	5	76	Do.
-14ad	Oliver DeLong....	1936	Dr	150	16	P	S, G	A	T, E	I	Hpb	.5	4,360.29	57.24	Aug. 20, 1947	R1,100	......	73	
-15ac	Carl Bauer.......	1941	Dr	156	24	P	S, G	A	T, E	I	Tc	2.8	4,381.79	61.60	Sept. 4, 1947	M985	......	240	
-15dd	H. Lauck..........	......	Dr	70	6	P	S	A	N	N	Tc	1.0	4,376.19	33.00	......do.........	....	......	....	
-17bb	George Ostwald..	1947	Dr	......	6	P	S	A	C, E	D, S	Tc	1.0	4,410.85	26.97	Dec. 11, 1947	....	......	....	
-17da	C. E. Freudiger..	1927	Dr	120	6	P	G, S	A	C, E, W	D, S	Bpb	.3	4,401.90	25.86	Dec. 6, 1947	....	......	....	

Records of wells and **springs** *in the lower South Platte River valley, Colorado and Nebraska*—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Morgan County, Colo.—Continued																		
B3-58-19ab	H. Clatworthy......	......	Dr	65	18	P	S	A	N	N	Tc	1.0	4,425.73	17.09	Dec. 11, 1947	....	......	......	Eos.
-20bc	Henry Brandt......	......	Dr	60	6	P	S	A	N	N	Ls	0	4,418.1	14.00	......do.........	....	......	......	S-90.
-20da	W. E. Ambrose......	1946	Dr	100	4	P	S	A	C, W	S	Tc	3.0	4,406.44	11.00	Nov. 18, 1947	....	......	......	Eos.
-21bc	......do.............	1947	Dr	106	4	P	S	A	C, W	D, S	Bpb	1.5	4,403.74	12.65	......do.........	....	......	......	L, Sca.
-22bb	Ralph Solt..........	......	Dr	......	......	P	S	A	C, W	S	Tpp	2.0	4,404.58	7.62	Sept. 2, 1947	....	......	......	
-22dd	J. H. Hoffman...	1942	DD	20.0	18	P	S	A	J, E	D, S	Tpp	1.0	4,387.03	8.24	Aug. 27, 1947	....	......	......	
-23aa	Jacob Knaub.......	1944	Dr	128	18	P	S, G	A	T, E	I	Hpb	1.0	4,363.73	44.87	......do.........	M628	......	80	S-150.
-23cb	George Ostwald...	1942	Dr	50	4	P	S	A	C, W	D, S	Tpp	1.0	4,375.07	8.28	......do.........	....	......	......	
-24bb	Riney Temple.....	1947	Dr	170	18	P	S, G	A	T, E	I	Hpb	1.0	....	33.50	Oct. 15, 1948	M590	34	......	S-185.
-24cc	A. Mortenson.....	1940	Dr	150	18	P	S, G	A	T, E	I	Hpb	1.0	4,362.12	28.10	July 8, 1947	M770	33	160	
-25ac	Henry Lauck.......	1938	Dr	128	18	P	S, G	A	T, G	I	Hpb	2.0	4,353.02	15.40	......do.........	M920	11	160	Eos.
-25bb	L. C. Solt..........	1940	Dr	150	10	P	S, G	A	T, E	I	Idp	.5	4,363.46	25.40	......do.........	M610	......	160	
-25cc	J. D. Crouch.......	......	Du	......	......	P	S	A	C, E	D	Tpp	1.0	4,351.94	5.50	......do.........	....	......	......	
-25db	W. H. Paulson......	1937	Dr	118	16	P	S, G	A	T, E	I	Tpp	1.0	4,349.32	11.66	......do.........	R1,300	......	149	
-27da	James Green.......	......	Du	46.0	48	P	R	A	C, W	D, S	Ls	0	4,412.70	39.15	Dec. 17, 1948	....	......	......	Sca, Eos.
-29da	Mr. Smit...........	......	Dr	71.0	4	P	S	D, A	C, W	S	Tc	1.8	4,433.58	30.98	Nov. 18, 1947	....	......	......	
-36ac	J. G. Hoffman......	......	......	......	......	N	S, G	A	H, T	I	Btr	.5	4,346.35	1.56	May 20, 1947	R800	$\frac{1}{2}$	30	Tw.
-36ad	......do..............	1947	Dr	88	18	P	S, G	A	T, E	I	Hpb	1.3	4,351.38	8.10	May 12, 1947	R1,500	45	120	L.
B3-59-1ab	H. F. Fuerst.........	1938	Dr	230	24	P	S, G	A	T, E	I	Tpp	1.0	4,422.68	52.96	Apr. 22, 1948	R2,000	......	200	

-2aa	....	......	Dr	......	6	P	S, G	A	C, H	D	Tc	.6	4,429.84	39.35	Apr. 15, 1949	....	......	......	
-3aa	......do..............	......	Dr	40.0	2	P	S, G	A	N	N	Tc	1.3	....	39.53	Mar. 23, 1948	....	......	......	
-4da	Bert Ross...........	1930	Dr	110	4	P	S, G	A	N	N	Tpp	0	4,457.17	35.00	July 10, 1947	....	......	......	Eos.
-6db	....	......	Dr	55.0	6	P	S, G	A	C, W	D, S	Tc	.5	4,502.16	51.40	Mar. 21, 1949	....	......	......	
-10ad	John Salter..........	......	Dr	100	6	P	S, G	A	N	O	Twc	.5	4,433.28	31.72	July 9, 1947	....	......	......	
-10bc	B. H. McConnell..	1945	Dr	156	18	P	S, G	A	T, E	I	Tc	2.0	4,452.71	41.03	Dec. 17, 1947	R1,250	42	......	Sca, S-183.
-10cb	Ross & Trewet.....	1947	Dr	182.5	18	P	S, G	A	T, E	I	Tc	1.0	4,446.18	36.50	......do..........	R1,300	34	......	S-185.
-10dc	......do..............	1937	Dr	196	18	P	S, G	A	T, D	I	Hpb	2.0	4,456.06	42.12	......do..........	R1,300	......	160	Eos.
-11cb	George Nukaya...	1940	Dr	168	18	P	S, G	A	T, E	I	Fs	.5	4,438.80	26.49	Dec. 16, 1947	R800	......	154	
-11cc	A. H. Dennis.....	1935	Dr	150	16	P	S, G	A	T, E	I	Ls	....	4,448.4	25	....	R730	......	72	
-11dc	J. H. Roediger.....	1937	Dr	140	18	P	S, G	A	T, E	I	Ls	....	4,434.4	24	....	R1,250	18	250	Eos.
-11dd	......do..............	......	Dr	60.0	4	P	S	A	C, W	D, S	Tpp	1.0	4,435.30	20.60	Dec. 15, 1947	....	......	......	
-13aa	David Fletcher....	......	Dr	60.0	4	P	S	A	C, H	D	Tc	.5	4,426.35	23.83	Dec. 11, 1947	....	......	......	
-13bb	E. C. Newman...	1925	Dr	77.0	16	P	S	A	N	N	Tc	0	4,439.29	17.06	Dec. 15, 1947	....	......	......	
-14ab	Theda Williams..	1900	Dr	37.0	4	P	S	A	J, E	D, S	Tpp	.5	4,432.10	15.78	Dec. 16, 1947	....	......	......	
-15aa	Ross & Trewet....	1932	Dr	179	16	P	S, G	A	T, G	I	Hpb	1.0	4,455.73	37.53	Dec. 17, 1947	R1,100	......	115	Eos.
-15bd	Mr. Weimer.........	......	Dr	41.0	4	P	S	A	C, W	S	Tc	.5	4,459.86	39.59	Dec. 19, 1947	....	......	......	
-20cd	Mr. Leonard........	1947	Du	22	60	C	S, G	A	N	N	Tc	0	4,546.82	18.00	Mar. 21, 1949	....	......	......	
B3-60 -1ab	H. D. Pugh.........	1938	Dr	214	18	P	S, G	A	T, D	I	Tc	0	4,517.21	70.55	Oct. 3, 1947	M1,290	25	90	Eos.
-1cc	R. Stout.............	1946	Dr	180	18	P	S, G	A	T, E	I	Hpb	.5	4,524.76	76.90	......do..........	R1,200	......	95	Do.
-2cb	H. Walker..........	1939	Dr	208	18	P	S, G	A	T, E	I	Ls	....	....	75	....	M1,110	......	200	
-2cd	......do..............	1936	Dr	176	24	P	S, G	A	T, D	I	Hpb	0	4,534.40	75.15	Oct. 3, 1947	M1,090	19	200	
-2dc	H. E. Kress.........	1938	Dr	146	24	P	S, G	A	T, E	I	Fs	0	4,521.67	68.86	......do..........	M735	28	160	
-3ac	J. E. Nelson........	1944	Dr	195	......	P	S, G	A	T, E	I	Bpb	1.0	4,528.12	74.46	......do..........	R1,000	14	160	Eos.
-3bc	H. A. Frank.........	1948	Dr	190	18	P	S, G	A	T, E	I	Ls	....	4,525.2	....	....	....	......	......	Do.
-3cc	......do..............	1936	Dr	155	24	P	S, G	A	T, E	I, O	Tvp	.5	4,531.73	67.20	Sept. 23, 1947	M1,190	......	295	L.
-3dc	William Brethauer	1945	Dr	198	......	P	S, G	A	T, E	I	Hpb	1.0	4,534.59	72.91	Oct. 3, 1947	R1,300	9	193	Eos.
-4ad	Conrad Laupham..	1936	Dr	151	16	P	S, G	A	T, E	I	Fs	0	4,527.91	64.88	Sept. 22, 1947	M1,090	15	90	L.
-4dc	Carl Brethauer.....	1946	Dr	......	18	P	S, G	A	T, E	I, O	Tc	.5	4,535.78	66.60	Sept. 23, 1947	M920	18	65	
-5dc	H. Bigler............	......	Dr	129.1	18	P	S, G	A	T, E	I	Hpb	.8	4,529.10	42.74	Apr. 19, 1947	R1,600	15	200	
-8ac	Robert H. Bigler...	1948	Dr	135	18	P	S, G	A	T, E	I	Hpb	1.0	4,540.61	50.75	Oct. 21, 1948	M885	24	......	Eos.
-8dc	......do..............	1947	Dr	135.8	18	P	S, G	A	T, E	I, O	Hpb	1.0	4,543.07	44.19	Apr. 17, 1947	R1,500	20	160	
-9ad	Mrs. Thomas Mate	......	Dr	195	......	P	S, G	A	T, E	I	Ls	....	....	60	....	R1,000	......	202	
-9cd	F. A. Trinkle.....	1945	Dr	90.0	18	P	S, G	A	T, E	I	Hpb	0	4,538.96	51.60	Nov. 13, 1947	R1,200	......	150	S-131.
-9dd	......do..............	1936	Dr	151	24	P	S, G	A	T, E	I	Ls	....	4,543.2	49	....	M1,140	40	......	
-10ac	C. A. Axelson.....	1947	Dr	205	18	P	S, G	A	T, E	I	Hpb	.8	4,536.63	66.41	Nov. 13, 1947	M840	......	60	
-10bd	J. Schlagel.........	1937	Dr	178	24	P	S, G	A	T, E	I	Hpb	.7	4,536.78	64.42	......do..........	M675	19	160	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
Morgan County, Colo.—Continued																			
B3-60-10cc	Walter Bush......	1937	Dr	168	......	P	S, G	A	T, E	I	Ls	......	4,544.2	65	....	M720	......	80	
-10cd	R. C. Gilland......	1939	Dr	150	18	P	S, G	A	T, E	I	Tvp	0.6	4,545.02	65.35	Oct. 31, 1947	R1,250	......	130	Eos.
-11ac	Mrs. N. Rosener..	......	Dr	131	18	P	S, G	A	T, E	I	Hpb	1.0	....	66.10	.....do........	R900	25	150	
-11ca	H. Bigler..........	1945	Dr	190	18	P	S, G	A	T, E	I	Ls	......	....	60	....	R1,400	20	200	
-11cc	John L. Wirth.....	......	Dr	......	......	P	S, G	A	C, E	D, P	Ls	......	....	60	....	....	......	......	Sca.
-13cd	Kroh brothers......	1946	Dr	165	18	P	S, G	A	T, E	I, O	Hpb	1.2	4,558.91	57.54	Oct. 8, 1947	....	......	153	
-14bb	Wiggins Potato Growers Association.	1943	Dr	147	18	P	S, G	A	T, E	In	Fs	0	4,546.33	62.39	Feb. 28, 1949	R400	......	......	Eos.
-14cc	Riley Howell......	1950	Dr	212	18	P	S, G	A	T, E	I	Tc	1.0	....	65.93	July 24, 1950	....	......	......	Eos.
-15bd	W. Bush..........	1947	Dr	225	......	P	S, G	A	T, E	I	Hpb	1.0	4,551.47	62.14	Oct. 31, 1947	R1,200	......	200	
-15cd	Adam Weimer....	1938	Dr	135	24	P	S, G	A	T, E	I	Bpb	1.0	4,555.18	59.40	Nov. 2, 1949	R1,350	......	110	Eos.
-15dc	.....do..............	1945	Dr	135	18	P	S, G	A	T, E	I	Ls	......	4,551.8	54	....	M1,400	......	140	Eos.
-16dc	C. Johnson.........	1939	Dr	141	18	P	S, G	A	T, E	I	Hc	.5	4,559.00	58.58	Nov. 13, 1947	....	......	120	
-18db	Harry James.......	1936	Dr	90	24	P	S, G	A	T, D	I	Ls	......	....	45	....	R1,100	15	100	Eos.
-20aa	H. Bigler..........	1937	Dr	136	24	P	S, G	A	T, E	I	Bpb	.5	4,558.34	50.20	Nov. 14, 1947	R1,400	30	180	
-20ac	L. A. English......	1937	Dr	109	24	P	S, G	A	T, E	I	Hpb	1.0	4,566.15	47.27	.....do........	R800	......	120	
-20dc	.....do..............	1942	Dr	130	18	P	S, G	A	T, E	I	Bpb	.8	4,571.36	51.85	.....do........	R800	......	160	Eos.
-21bc	H. Bigler..........	......	Dr	62.5	4	P	S, G	A	C, H	D	Tc	.5	4,564.34	54.23	Apr. 19, 1947	....	......	......	
-21bd	.....do..............	......	Dr	121	18	P	S, G	A	T, E	I	Tc	0	4,560.36	57.36	Nov. 15, 1947	R1,000	25	160	

-21cd	.....do..............	1942	Dr	123	18	P	S, G	A	T, E	I	Tc	0	4,571.32	58.08	......do.........	M900	25	180	
-21dc	.....do..............	1937	Dr	104	24	P	S, G	A	T, E	I	Tc	.5	4,570.36	58.85	......do.........	M600	45	160	
-22ac	William Kennish Sr.	1937	Dr	146	24	P	S, G	A	T, E	I	Bpb	1.0	4,562.71	58.10	Nov. 13, 1947	M1,240	25	200	L.
-22bc	Adam Weimer....	1937	Dr	155	24	P	S, G	A	T, E	I	Tvp	.5	4,562.84	58.35	Nov. 15, 1947	M980	28	140	
-22cc	B. A. Holden.....	1935	Dr	120	24	P	S, G	A	T, E	I, O	Tvp	.2	4,568.56	62.53	Oct. 3, 1947	M630	......	......	
-24cd	C. Willers.........	1943	Dr	180	18	P	S, G	A	T, E	I	Hpb	0	4,572.32	56.75	Nov. 19, 1947	M950	25	200	Eos.
-24dc	A. H. Nix..........	......	Dr	170	18	P	S, G	A	T, E	I	Ls	......	4,565.7	50	....	M770	38	......	
-25ac	T. Harshman.....	1941	Dr	185	......	P	S, G	A	T, E	I	Ls	......	....	58	....	R1,000	45	150	Eos.
-25cd	A. K. Hepperley..	1947	Dr	170	18	P	S, G	A	T, E	I	Tc	1.0	4,584.83	54.18	Nov. 19, 1947	M675	31	123	Do.
-26ac	Gilbert Graff......	1950	Dr	175	20	P	S, G	A	T, T	I	Tc	1.5	....	58.34	May 29, 1950	....	......	100	Do.
-27bc	M. Harshman.....	......	Dr	115	18	P	S, G	A	T, G	I	Hpb	1.0	4,573.62	60.29	Aug. 26, 1947	....	......	......	
-27dd	William Kennish, Sr.	1947	Dr	137	18	P	S, G	A	T, D	I	Tpp	0	....	39.58	Nov. 13, 1947	R1,200	......	120	Do.
-28ad	I. D. Jensen.......	1934	Dr	112	15	P	S, G	A	T, E	I	Ls	......	4,576.1	50	....	M730	......	155	L.
-28cd	.....do..............	1946	Dr	91	18	P	S, G	A	T, D	I	Hpb	0	4,584.72	56.74	Nov. 15, 1947	M295	23	60	Eos.
-29ad1	H. Hanson.........	1935	Dr	108	24	P	S, G	A	T, E	I	Hpb	.6	4,580.13	53.53	Nov. 14, 1947	R1,100	22	110	
-29ad2	.....do..............	1946	Dr	112	18	P	S, G	A	T, E	I	Hpb	2.5	4,579.22	50.45	......do.........	M1,000	12	110	Eos.
-29dd1	Henry Herbst......	1937	Dr	93	......	P	S, G	A	T, E	I	Bpb	0	4,588.15	52.10	......do.........	R800	......	120	Do
-29dd2	.....do..............	1948	Dr	115	18	P	S, G	A	T, E	I	Hpb	0	....	55.42	Aug. 31, 1948	R1,000	23	......	Eos.
-31cb	L. A. Wathen....	1940	Dr	101	......	P	S, G	A	T, E	I	Idp	1.5	4,618.84	41.65	Apr. 27, 1948	R1,000	......	290	Do.
-32cb	L. W. Elstun.......	1937	Dr	84	24	P	S, G	A	T, E	I, O	Tc	0	4,599.55	41.81	Apr. 30, 1947	M380	25	75	Sca.
-33ca	H. Herbst..........	......	Dr	......	4	P	S	A	C, W	S	Tc	3.0	4,591.03	35.49	Mar. 18, 1948	....	......	......	
-33dd	Virgil Reck.......	1936	Dr	97	24	P	S, G	A	T, G	I	Idp	1.3	4,589.47	53.05	.....do.........	M670	......	80	L.
-36dc	Mr. Howell.......	1946	Dr	170	18	P	S, G	A	T, G	I	Hpb	.5	4,599.25	55.13	Nov. 19, 1947	R1,050	34	......	Eob
B4-55-1cd	R. C. Rasmussen..	......	Dr	70	6	P	S, G	A	C, E	S	Tpp	2.2	4,162.36	18.00	Aug. 27, 1947	....	......	......	Eos.
-1da	M. Joppa..........	......	Dr	87	6	P	S, G	A	C, W	D	Ls	0	....	14	....	....	......	......	L.
-2dd	R. C. Rasmussen..	1934	Dr	76	24	W	S, G	A	T, E	I	Hc	.9	4,153.55	15.80	July 9, 1947	R1,000	......	111	Eos.
-3bc	Trowel Ranch....	......	DD	......	12	P	S, G	A	H, G	I, O	Tpc	.5	4,153.71	11.60	Nov. 3, 1947	....	......	......	
-3cd	Alex Nuss..........	1943	Dr	80	18	P	S, G	A	T, E	I	Ls	......	4,168.5	13	....	R1,800	3	130	Eos.
-4ad	Owen Mengal.....	1939	DD	55	......	P	S, G	A	H, E	I	Tdp	1.0	4,153.19	10.95	July 9, 1947	R1,500	......	120	
-4bd	Hickman & Overs.	1935	DD	......	15	P	S, G	A	H, E	I	Fs	0	4,152.36	4.95	.....do.........	R1,300	16	120	
-4dc	Carl Walker.......	1934	DD	80	15	P	S, G	A	H, E	I, O	Tc	-8.0	....	3.45	.....do.........	R1,360	10	240	Eos.
-6ac	C. W. Beery......	......	Dr	......	......	P	S, G	A	T, E	I	......	......	....	......	....	R700	......	123	
-6ad	O. H. Grauel......	1935	Dr	80	......	P	S, G	A	T, E	I	Idp	1.9	4,167.21	11.50	July 5, 1947	R2,000	......	150	
-6cb1	C. W. Beery......	......	Dr	100	......	P	S, G	A	T, E	I	Ls	......	4,197.0	28	....	R1,250	......	125	
-6cb2	.....do..............	......	Dr	39.0	6	P	S, G	A	C, W	D, O	Tpp	1.5	4,193.28	28.84	Nov. 3, 1947	....	......	......	Sca.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
Morgan County, Colo.—Continued																			
B4-55-6cc	Nicholas Dimitroff	1935	Dr	55	14	P	S, G	A	T, T	I	Idp	1.2	4,181.42	16.10	July 5, 1947	....	......	38	
-7bd	Mr. Gardner.......	1911	DD	40	16	P	S, G	A	H, T	I	Tpc	0	4,169.20	3.00	.....do.........	....	......	160	
-7dd	J. Boxer............	1944	Dr	100	......	P	S, G	A	T, E	I	Hpb	.7	4,185.18	20.20	July 11, 1947	....	......	240	
-8ac	Carl Walker.......	1934	DD	70	......	P	S, G	A	H, T	I	Tpc	.6	....	10.30	July 10, 1947	....	......	55	
-8dc	J. Pederson........	1932	DD	83	14	P	S, G	A	H, T	I	Tpc	1.2	4,182.16	20.10	.....do.........	R800	......	83	
-9bc	William Pyle......	1946	Dr	112	18	P	S, G	A	T, E	I	Hpb	.8	4,171.76	20.80	.....do.........	M1,390	12	140	Eos.
-9cc	Mr. Walker........	1937	Dr	91	18	P	S, G	A	T, E	I	Ls	....	4,179.6	20	July 11, 1947	M1,580	24	240	Do.
-9dc	Rudolph & Schooley.	1927	DD	75	14	P	S, G	A	H, E	I, O	Tpc	2.0	4,177.20	17.80	.....do.........	R1,300	......	320	
-10ab	William Hauserman.	1930	DD	80	14	P	S, G	A	H, E	I	Tdp	1.2	4,161.38	14.05	July 9, 1947	M1,410	12	115	Eos.
-10bc	Prairie Investment Co.	1940	Dr	89	......	P	S, G	A	T, E	I	Ls	....	4,166.0	17	....	M1,190	9	130	Do.
-10cd	H. W. Schlater......	1929	DD	80	36	P	S, G	A	H, E	I	Tc	.5	4,172.11	12.50	July 11, 1947	M540	......	30	
-10dc	Gus Wahlert........	1939	Dr	88	18	P	S, G	A	T, E	I	Tc	1.0	4,174.08	12.30	.....do.........	R1,350	21	45	Eos.
-15aa	Alonzo Petteys.....	1940	Dr	87	18	P	S, G	A	T, E	I	Ls	....	4,173.95	16	....	....	......	200	
-15bc	G. G. Pabst.......	1946	Dr	79	18	P	S, G	A	T, E	I	Hpb	.5	4,178.63	15.00	Sept. 8, 1947	M940	12	80	Eos.
-16cc	Stratton sisters.....	1939	Dr	80	20	P	S, G	A	T, E	I, O	Fs	1.4	4,188.35	19.90	July 11, 1947	M1,390	15	480	
-17ad	Soren Bach.........	1935	DD	92	16	P	S, G	A	H, T	I	Tdp	2.9	....	24.05	July 10, 1947	R1,350	12	160	Eos.
-17cd	Pabst and Joppa....	1940	Dr	90	18	P	S, G	A	T, E	I	Bpb	1.5	4,192.28	20.20	July 11, 1947	R1,500	20	240	Do.

-18ac	Henry Hansen......	1936	DD	100	......	P	S, G	A	H, E	I	Tpc	1.4	4, 188.57	20.00	July 14, 1947	R1, 150	......	160	
-18bd	Woodrow Loest.....	1940	Dr	60	24	P	S, G	A	T, E	I	Tc	1.7	4, 190.22	21.30	.....do.........	M620	12	82	
-18cc	Henry Baumgardner.	1935	Dr	80	14	P	S, G	A	T, E	I, O	Tfb	1.3	4, 196.24	20.90	.....do.........	M500	19	160	
-18dc	Henry Louck.......	1936	Dr	95	18	P	S, G	A	T, E	I	Hpb	.3	4, 194.32	20.25	.....do.........	M1, 450	19	153	Eos.
-19bc	A. C. Lusby.......	1937	Dr	85	24	P	S, G	A	T, E	I	Hpb	1.3	4, 201.38	19.50	.....do.........	R1, 500	......	180	
-20bc	George White......	1930	Dr	85	......	P	S, G	A	T, E	I	Tc	1.1	4, 196.49	19.00	July 11, 1947	R1, 150	20	400	L.
-21aa	Hans Peterson......	1946	Dr	44	4	P	S, G	A	C, W	S	Tpp	1.0	4, 196.16	28.60	.....do.........	....	......	......	Eos.
-21ba	......do..............	1945	Dr	80	18	P	S, G	A	T, T	I	Tc	1.4	4, 187.53	19.50	.....do.........	R800	......	130	Do.
-22bb	......do..............	......	Dr	......	6	P	S	A	C, W	S	Tpp	1.1	4, 191.68	19.40	.....do.........	....	......	......	Sca.
-29ab	F. Colwell..........	......	Dr	45	......	P	S	D, A	C, W	S	Ls	......	....	12	....	....	......	......	
B4-56-1ca	G. Lebsock, Sr.....	1932	Dr	35	......	P	S, G	A	C, W	S	Ls	......	....	20	....	....	......	......	
-7cc	E. Erickson.........	1946	Du	......	72	W	S, G	A	T, E	I	Ls	......	4, 318.0	20	....	R300	......	......	
-8cd	R. E. Timberman..	......	Dr	90	6	P	R	P	C, W	D, S	Tc	.7	4, 253.00	52.20	July 2, 1947	....	......	......	
-11cb	J. M. Needham...	1934	Dr	103	24	P	S, G	A	T, D	I	Bpb	1.3	4, 205.37	28.55	.....do.........	R1, 070	25	200	
-12ab	P. W. Boughman..	1911	DD	......	10	P	S, G	A	V, G	I	Tpc	0	4, 179.60	10.10	July 3, 1947	....	......	43	
-12ba	C. W. Beery.......	......	Dr	......	14	P	S, G	A	T, E	I	Idp	1.3	4, 196.97	26.40	.....do.........	R1, 200	......	187	
-12ca	James Louis........	......	DD	......	......	P	S, G	A	H, G	I	Tdp	1.9	4, 179.43	6.80	July 2, 1947	....	......	10	
-12db	C. Hall.............	1932	Dr	56	16	P	S, G	A	T, E	I	Ls	......	4, 174.0	7	....	R1, 350	......	85	S-80.
-13ac	John Wilson........	1934	DD	35	14	P	S, G	A	H, E	I	Tdp	1.9	4, 178.40	3.65	July 1, 1947	....	......	50	Sca.
-14bb	J. M. Needham....	1940	Dr	116	24	P	S, G	A	T, E	I	Tc	.5	4, 207.72	27.50	July 2, 1947	R1, 500	30	247	
-14cd	E. Chartier.........	......	Dr	......	......	P	S, G	A	T, E	I	Ls	......	....	6	....	R1, 000	10	65	
-14dc	O. Christensen....	1938	DD	80	14	P	S, G	A	H, E	I	Tdp	2.6	4, 189.32	5.80	July 1, 1947	R1, 100	11	160	
-15cc	Mr. Reed..........	......	DD	......	18	P	S, G	A	H, E	I	Tpc	.5	4, 198.88	8.70	Apr. 27, 1948	....	......	......	
-15cd	......do..............	1948	Dr	85	18	P	S, G	A	T, E	I	Hpb	.5	4, 194.20	7.24	Aug. 13, 1948	....	......	......	
-18ab	Public school......	......	Dr	......	6	P	S, R	D, P	C, H	N	Tpp	.5	4, 295.60	8.40	July 2, 1947	....	......	......	
-19bb	Heinz Silz..........	1937	Dr	85	......	P	S, G	A	T, E	I	Hpb	1.2	4, 257.91	28.00	June 27, 1947	R1, 100	......	166	
-20bc	Alden Erickson....	1938	Dr	60	......	P	S, G	A	T, E	I	Hpb	2.6	4, 231.87	17.20	June 30, 1947	R1, 800	......	109	
-20db	Joseph Ireland......	1947	Dr	90	......	P	S, G	A	T, E	I	Hpb	1.3	4, 212.65	8.30	.....do.........	R1, 500	......	154	
-21bc	Levit and Averch..	......	Dr	96	......	P	S, G	A	T, E	I	Hpb	2.3	4, 208.63	8.00	.....do.........	R2, 000	7	145	
-22ac	J. Rudolph.........	1939	DD	70	16	P	S, G	A	H, E	I	Tdp	2.7	....	8.50	July 1, 1947	R1, 000	......	80	
-23ac	Hansen brothers...	1931	Dr	97	16	P	S, G	A	T, E	I	Ls	......	....	19	....	R1, 350	......	160	S-90.
-23bc	Mortensen & Danielson.	1945	Dr	96	16	P	S, G	A	T, E	I	Ls	......	4, 206.5	19	....	R1, 100	8	160	
-23dc	Hansen brothers...	1933	Dr	98	18	P	S, G	A	T, E	I, O	Cic	1.2	4, 210.32	21.00	June 30, 1947	M975	2	160	
-23dd	E. Kast.............	1946	Dr	101	......	P	S, G	A	T, D	I	Hpb	1.1	4, 208.38	19.00	July 1, 1947	R1, 600	15	133	Eos.
-24ac	William Vandy....	1934	DD	90	12	P	S, G	A	T, E	I	Tdp	3.5	4, 205.37	23.60	......do.........	R1, 200	......	300	
-25db	Adam Weber.......	1940	Dr	87	18	P	S, G	A	T, E	I	Ls	......	....	20	....	R1, 400	8	520	Eos.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B4-56-26bc	Danielson, Koehler, & Mohr.	1940	Dr	96	.....	P	S,G	A	T,E	I	Tc	0.8	4,217.32	21.60	June 30, 1947	....	.....	240	S-90.
-26cc	J. Rudolph	1940	Dr	90	12	P	S,G	A	T,E	I	Idp	1.9	4,224.36	24.00	July 1, 1947	M700	.....	100	Sca.
-26dc	Ruggles & Rediess	1946	Dr	105	.....	P	S,G	A	T,E	I	Hpb	3.4	4,223.09	24.10	.....do	M1,250	12	240	Eos.
-27ac	William Friehauf	1946	Dr	99	.....	P	S,G	A	T,T	I	Hpb	1.8	4,218.68	24.20	June 30, 1947	R2,100	5	160	Do.
-28db	E. Fries	....	Dr	80	.....	P	S,G	A	T,T	I	Ls	....	....	20	....	R1,500	.....	....	
-29bd	Fred Kouk	....	DD	....	.....	P	S,G	A	H,E	I	Tpc	0	4,239.77	26.80	July 2, 1947	R1,000	.....	95	
-30bc	....	....	Du	10	.....	N	S,G	A	N	N	Ls	....	4,222.2	5.00	Oct. 30, 1947	....	.....	....	Sca, Tw.
-33bb	F. Swanks	....	DD	128	.....	P	S,G	A	H,E	I	Tpc	0	4,236.57	23.40	July 2, 1947	M1,100	10	200	Sca.
-35cc	C. Bostrum	1940	Dr	70	.....	P	S,G	A	T,E	I	Ls	....	4,230.3	19	....	R1,400	.....	....	Eos.
-36da	H. C. Kjeldgaard	1947	Dr	37.0	6	P	S	D	C,H	D	Tpp	0	4,230.62	26.25	Aug. 27, 1947	....	.....	....	S-29.
B4-57-3bc	E. Pumphry	1932	Dr	30	18	P	S,G	A	T,E	I	Tpp	13.0	....	14.00	July 25, 1950	....	2	120	Eos,Ssu.
-12ca	I. V. Yearous	1932	Dr	68	24	P	S,G	A	T,D	I	Tdp	1.6	4,305.00	30.80	June 25, 1947	R400	.....	80	Eos.
-12cd	.....do	1937	Dr	78	24	P	S,G	A	T,E	I	Tdp	.9	4,303.00	26.40	.....do	R750	.....	160	Do.
-13ab	G. C. Moist	1940	Dr	56	18	P	S,G	A	T,E	I	Hpb	1.0	4,287.21	18.30	.....do	R680	.....	125	
-13da	Erik Erikson	1937	Dr	60	24	P	S,G	A	T,E	I	Ls	....	4,273.0	25	....	M1,290	.....	120	Sca.
-19db	H. W. Clatworthy	....	Dr	43.5	6	P	R	P	C,H	O	Tc	-6.5	4,407.04	41.05	Sept. 9, 1947	....	.....	....	Do.
-24db	Fred Dedrick	1946	Dr	58	.....	P	S,G	A	T,E	I	Hpb	1.8	4,255.89	19.00	June 25, 1947	R600	.....	142	L.
-25bb	John Robinson	1936	Dr	60	.....	P	S,G	A	T,D	I	Hpb	1.6	4,231.15	5.70	June 26, 1947	R1,200	.....	200	
-25dd	R. B. Lortez	1946	Dr	80	18	P	S,G	A	T,E	I	Hpb	0	....	14.60	June 25, 1947	R1,400	3	60	
-26bd	Peyton & Hays	1937	Dr	55	24	P	S,G	A	T,E	I	Hpb	-3.3	4,239.06	8.10	June 26, 1947	R1,800	.....	250	
-27ac	M. N. Wagner	1938	Dr	70	12	P	S,G	A	T,D	I	Tdp	.6	4,264.19	24.25	.....do	R900	.....	108	Eos.

-27cb1	L. H. Dierdorf	1945	Dr	74	18	P	S, G	A	T,E	I	Hpb	1.0	4,270.39	26.40	do.	R1,300	6	72	Do.
-27cb2	L. V. Smith		Dr		18	P	S, G	A	N	N	Tc	0	4,270.83	25.20	Nov. 1, 1948				
-27cc	N. L. Meekins	1936	Dr	83	24	P	S, G	A	T,G	I	Ls			24		R1,450	13	237	
-27db	T. E. Dunkan	1943	Dr	104	18	P	S, G	A	T,E	I	Bpb	1.0	4,264.38	25.85	June 26, 1947	M1,050	8	120	Eos.
-28ac	J. A. Schauermann	1940	Dr	105	20	P	S, G	A	T,E	I	Hpb	.7	4,275.39	26.90	do.	R1,200	12	151	Do.
-28bd	J. B. Coulter		Dr	33.0	4	P	S, G	A	N	O	Tc	.2	4,278.28	28.18	May 31, 1947				
-28cc	do.	1940	Dr		18	P	S, G	A	T,E	I	Fs	.8	4,280.48	29.10	June 23, 1947	M1,510	13	260	
-29db	R. Hoffman	1936	Dr	80	24	P	S, G	A	T,E	I	Fs	-2.9	4,286.83	27.95	do.	R700		120	Eos.
-29dc	Foster Lieu	1941	Dr	85		P	S, G	A	T,E	I	Ls		4,285.0	29	June 23, 1947	R1,200		80	Eos.
-31bb	City of Fort Morgan	1947	Dr	84	18	P	S, G	A	T, E	I	Hpb	1.5	4,273.99	9.44	Mar. 17, 1949	R600	22		Sca.
-31db1	do.		Dr	48	16	P	S, G	A	N	O	Tmc	1.0	4,268.41	9.14	July 11, 1947				Eos.
-31db2	do.	1937	Dr	48	18	P	S, G	A	T,E	In	Ls			8		R1,000	10		Do.
-31db3	do.	1943	Dr	48	18	P	S, G	A	T,E	In	Ls			8		R1,200	10		Eos, Sca.
-31db4	do.	1933	Dr	48	18	P	S, G	A	T,E	In	Ls			8		R1,200	10		Do.
-31db5	do.	1932	Dr	48	14	P	S, G	A	T,E	In	Ls			8		R500	3		Eos.
-31db6	do.	1948	Dr	51	18	P	S, G	A	T,E	In	Ls			12		R1,800	12		Do.
-33ac	Noel Meekins	1947	Dr	90	24	P	S, G	A	T,E	I	Hpb	1.0	4,253.90	7.45	June 26, 1947	R1,500			Do.
-36cb	Bolinger & Kjeldgaard		Dr	100		P	S, G	A	T,E	I	Hpb	.5		33.65	June 20, 1947		16	400	
-36cc	A. E. Zittle	1935	Dr	112	16	P	S, G	A	T,E	I	Hpb	.8		33.05	do.	R1,280	6	240	
B4-58-7ca	Thomas Castagno		Dr	29.0	6	P	S, G	A	C,G	S, O	Tpp	0	4,371.70	17.00	Sept. 10, 1947				Eos.
-7cb	Samuel Lepwith		Dr	12.0	2	P	S, G	A	P,H	D, O	Tph	2.5	4,348.60	8.66	Mar. 2, 1948				
-11dd	H. W. Schocke		Dr	300.0+	6	P	Ss	F	N	N	Tc	-2.3		128.30	Sept. 9, 1947				
-12cd	A. Best		Du	25	48	P	R, S	P, D	C,W	S	Tpp	.5		20.10	do.				
-18aa	Nathan Swartz	1949	Dr	17.0	1¼	P	R	P	N	O	Tc	1.2	4,340.40	Dry	Oct. 14, 1949				Cow.
-18dc	Angelo Covelli	1949	Dr	60.0	1¼	P	S, G	A	N	O	Tc	2.0	4,384.74	42.50	June 3, 1949				Do.
-18dd	do.		Dn		2	P	S, G	A	P,H	D	Bpb	3.0	4,343.40	8.95	Mar. 8, 1949				
-19bc	N. B. Work	1938	Dr	116	18	P	S, G	A	T,E	I, O	Tvp	0	4,395.71	49.50	June 13, 1949	R1,000	36	220	Cow, Eos.
-19dc	H. Adler	1947	Dr			P	S, G	A	T,G	I									
-22ba	William Bailey		Dr	18.0	6	P	S	D	C,W	S, O	Tc	0	4,462.11	15.30	Sept. 9, 1947				
-27cc			Dr	43	6	P	S, G	A	N	N	Ls		4,318.0	16					
-29ac	A. C. Berryhill	1937	Dr		18	P	S, G	A	T,E	I								80	
-29ad	do.		Dr		6	P	S, G	A	C,H	D, S, O	Tc	1.0	4,355.41	36.45	Mar. 8, 1949				Cow.
-29cc	W. E. Moore, Sr.	1947	Dr	159	18	P	S, G	A	T,E	I	Tc	.5	4,399.61	61.27	Jan. 6, 1948	R1,200	7	147	Eos.
-29dc	L. Platt	1942	Dr	135		P	S, G	A	T,E	I						R800		140	
-30ac	C. Koehler	1946	Dr	175		P	S, G	A	T,E	I	Hpb	2.0	4,404.73	59.55	Sept. 29, 1947	R1,600		240	Eos.
-30dc	William Christ	1948	Dr	154	18	P	S, G	A	T,E	I	Ls			60					
-31ba	A. V. Benson	1948	Dr	154	18	P	S, G	A	T,E	I	Ls			60					
-31bb	P. Schlegal	1944	Dr	180		P	S, G	A	T,E	I	Tc	1.0	4,414.05	60.70	Sept. 29, 1947	M1,390		100	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B4-58-31cc	P. C. Brown	1948	Dr	220	18	P	S, G	A	T,E	I	Tc	0.5	4,418.19	61.63	Feb. 9, 1948	R1,400	10	......	L.
-32bb	Mr. Quinn	......	Dr	165	18	P	S, G	A	T,G	I, O	Hpb	1.0	4,401.24	66.80	Sept. 30, 1947	......	......	300	Eos.
-33ca	Rollie Reed	......	Dr	25	4	P	S, G	A	N	N	Tpc	0	4,332.12	11.12	Dec. 11, 1947	......	......	......	
-34aa	......	......	Dr	45	......	P	S, G	A	N	N	Ls	......	4,328.0	35	......	......	......	......	
B4-59-2aa	R. Lamborn	......	Dr	17	6	P	S, G	A	C,E	S	Tc	-6.2	4,378.36	2.80	Sept. 10, 1947	......	......	......	Eos.
-9dd	W. J. Woods	......	Dr	85	2	P	S, G	A	C,W	D	Ls	......	4,422.0	60	......	......	......	......	
-10ba	C. Schaefer	1944	Dr	33	18	P	S, G	A	T,E	I	Tc	.5	4,344.79	4.65	Mar. 28, 1948	R800	......	......	Eos.
-13aa	A. W. Gabriel	......	Sp	......	......	......	S, G	A	F	N	......	......	......	......	......	R35	......	......	Sca, Eos.
-13dc	J. D. Crouch	1940	Dr	120	18	P	S, G	A	T,E	I	Bpb	1.0	4,407.80	60.85	May 18, 1948	M1,257	13	100	Eos, Sca, Pt.
-14cc	C. M. Work	1948	Dr	87	2	P	S, G	A	C,G	D	Ls	......	......	48	......	......	......	......	
-18cc	A. P. Price	1943	Dr	157	18	P	S, G	A	T,E	I	Hpb	0	4,466.25	77.48	Oct. 3, 1947	M990	18	80	Eos.
-19aa	......do	1948	Dr	163	18	P	S, G	A	T,T	I	Tc	.5	4,470.37	67.90	Apr. 18, 1949	M830	22	......	Do.
-21aa	Mr. Dean	......	Dr	90	6	P	S, G	A	C,W	D, S	Ls	......	......	70	......	......	......	......	
-21cc	Bijou Irr. Co.	......	Dr	......	6	P	S, G	A	C,H	D	Tpp	.5	4,459.24	37.75	Mar. 23, 1948	......	......	......	
-22bc	Chester Moore	......	Dr	87	2	P	S, G	A	C,W	D, S	Ls	......	......	60	......	......	......	......	
-28cd	J. W. Challis	......	Dr	50	6	P	S, G	A	C,W	D, S	Ls	......	......	20	......	......	......	......	
-31bc	Marion Pugh	1944	Dr	210	18	P	S, G	A	T,D	I, O	Tc	1.0	4,503.80	74.95	July 10, 1947	M690	18	160	Eos.
-33ca	Bruno Elder	1941	Dr	45.5	6	P	S, G	A	C,W	D, S	Tpp	0	4,460.08	35.10	Apr. 18, 1949	......	......	......	
-35ac	Dr. H. F. Fuerst	......	Dr	218	......	P	S, G	A	T,E	I	Bpb	1.0	4,440.31	49.80	May 13, 1948	......	......	......	
-36cc	......do	1947	Dr	239	......	P	S, G	A	T,E	I, O	Hpb	0	4,435.88	66.10	Sept. 29, 1947	M1,410	13	200	Eos.
-36cd	......do	1948	Dr	221	18	P	S, G	A	T,E	I	Ls	......	4,423.1	61	......	R1,400	......	......	S-239.

B4-60-2aa	Mr. Ward		Dr	18.0	8	P	S, G	A	C,H	D, O	Tpp	.0	4,380.43	7.50	Sept. 15, 1947				Sca.
-3dd			Dr		6	P	S, G	A	N	N	Tc	-4.0	4,390.80	5.15	Apr. 18, 1949				
-5cc	Roy Madsen		Dr	69	24	P	S, G	A	T,G	I	Ls			30		R900		52	Eos.
-5cd	do		Du			W	S, G	A	P,H	S, O	Tpp	1.0	4,405.07	4.22	Oct. 9, 1947				
-6cc	Alex Johnson	1945	Dr	95		P	S, G	A	T,G	I, O	Tpp	1.0	4,456.05	42.82	Apr. 11, 1948	M1,320	20	80	Eos, Sca.
-7bc	T. E. McSay	1945	Dr	102		P	S, G	A	T,G	I	Ls			47		R1,700		160	S-113.
-7db	Marvin Etchison		Dr	90	12	P	S, G	A	T,T	I	Bpb	0	4,421.39	13.15	Sept. 16, 1947	R1,200		125	
-9ab	Mr. Racchio		Dr	45		P	S, G	A	T,T	I, O	Hpb	0	4,399.14	8.70	Sept. 15, 1947	R1,200		15	
-12bc	Robert Ehrlich	1948	Dr	141	18	P	S, G	A	T,E	I	Ls		4,462.0	50		M1,070			Eos.
-12cc	Barton & Berchstedt	1942	Dr	180	18	P	S, G	A	T,E	I, O	Hpb	1.0	4,467.34	69.80	Oct. 3, 1947	M750	12	160	
-12dd	A. P. Price	1945	Dr	180	18	P	S, G	A	T,E	I	Bpb	0	4,453.95	65.95	Sept. 26, 1947			160	
-13cc	H. H. Alder	1949	Dr	158	18	P	S, G	A	T,G	I	Hpb	1.0		70.21	June 20, 1949			100	Eos.
-14bb	F. Martins	1944	Dr	180	18	P	S, G	A	T,E	I	Hpb	.5	4,471.85	71.60	Sept. 26, 1947	M1,030	11	300	
-15bb		1948	Dr	80	2	P	S, G	A	C,W	S	Ls			70					
-22cd	J. E. Moran	1944	Dr	217		P	S, G	A	T,E	I	Ls		4,497.9	71		R1,400	10	220	
-23ac	George Burnhardt	1944	Dr	205	18	P	S, G	A	T,E	I	Ls			75		M910		160	
-23cd	W. W. Walker	1937	Dr	212	24	P	S, G	A	T,E	I, O	Hpb	.5	4,494.66	79.14	Oct. 3, 1947	M1,000	15	160	
-23dc	Edward Davis	1942	Dr			P	S, G	A	T,E	I	Fs	1.0	4,492.98	80.15	Sept. 25, 1947	M1,060		240	
-24bb	L. Christensen	1942	Dr	165	18	P	S, G	A	T,E	I	Bpb	.5	4,480.30	70.31	Apr. 22, 1948	R1,200		200	Eos.
-24cc	R. Johnson	1937	Dr	225	18	P	S, G	A	T,E	I	Hpb	0	4,488.58	78.30	Sept. 25, 1947	M1,620	9	300	Sca, L.
-24dc	William Barber	1945	Dr	243		P	S, G	A	T,E	I	Hpb	1.0	4,488.68	78.23	Oct. 3, 1947	M1,540	16	250	Eos.
-25cb	T. A. Hudson	1943	Dr	180	18	P	S, G	A	T,E	I	Bpb	2.0	4,494.31	80.70	Sept. 25, 1947	M1,290	9	160	Do.
-25cd	F. G. Shelton	1946	Dr			P	S, G	A	T,E	I	Hpb	0	4,500.70	84.82	Sept. 29, 1947	R1,200		160	
-25dc1	Asa T. Jones	1937	Dr	235	20	P	S, G	A	T,E	I	Tc	0	4,499.79	82.15	July 10, 1947	M760		100	Eos.
-25dc2	do	1945	Dr	240	20	P	S,G	A	T,E	I	Ls		4,499.8	80		M1,130	25	130	L.
-26ac	H. Stroh, Sr.	1944	Dr			P	S,G	A	T,E	I						M800		160	
-26bd	Elizabeth Alles	1946	Dr	220		P	S, G	A	T,E	I	Hpb	1.0	4,498.45	83.35	Sept. 25, 1947	M685	15	160	
-26dc	H. Stroh	1945	Dr			P	S, G	A	T,E	I	Hc	.5	4,506.57	79.44	Apr. 22, 1948	M910	15	160	
-27cc	T. M. Dille	1940	Dr	233	24	P	S, G	A	T,E	I	Ls		4,508.6	69		M1,110		220	
-27dc	S. Harshman	1944	Dr			P	S, G	A	T,E	I	Fs	1.0	4,506.63	76.98	Oct. 3, 1947	R1,200	18	140	
-28ad	Asa T. Jones	1944	Dr	180		P	S, G	A	T,E	I	Hpb	1.8	4,504.64	74.45	Sept. 22, 1947	R1,000		170	
-30bb	William Van Pelt	1937	Dr	115	6	P	S, G	A	C,E	D,S	Tc	.2	4,491.22	47.83	Mar. 21, 1949				
-32ad	C. W. Demsey		Dr	212		P	S, G	A	C,W	D,O	Tpp	1.0	4,507.27	49.80	Sept. 23, 1947				Eos.
-33dd	Conrad Laubhan	1945	Dr	157	18	P	S, G	A	T,E	I	Hpb	1.0	4,523.57	68.00	Oct. 3, 1947	M1,190	24	180	Do.
-34ac	Ida Harshman	1938	Dr	219	18	P	S, G	A	T,E	I	Ls			69		M1,000		240	
-34bc	Seth Harshman		Dr	220		P	S, G	A	T,E	I	Ls		4,516.5			M715			

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Morgan County, Colo.—Continued										
B4-60-34cc	J. Harshman	......	Dr	150	16	P	S, G	A	T, G	I, O	Tc	0	4,521.91	67.49	Apr. 23, 1948	M885	15	160	Sca.
-34dc	M. J. Beauprez	......	Dr	220	18	P	S, G	A	T, E	I, O	Tpp	.6	4,520.26	75.04	Aug. 18, 1947	M1,150	11	160	Eos.
-35cc	H. Walker, Jr.	1945	Dr	190	......	P	S, G	A	T, E	I	Ls	......	4,517.1	......	......	R900	......	100	
-36ba	F. Pugh	1934	Dr	110	12	P	S, G	A	T, E	I	Ls	......	......	75	......	R400	......	30	
-36dc	C. L. Hackley	1941	Dr	......	......	P	S, G	A	T, E	I	......	......	......	......	......	M910	......	140	
B5-55-23bd	Mr. McClusky	......	Dr	50	6	P	S	D	C, W	S	Tpp	0	4,139.44	16.00	Sept. 4, 1947	......	......	......	
-23ca	William Segelke	......	Dr	40	6	P	S	D	C, W	S	Bpb	0	4,123.68	9.25	......do......	......	......	......	
-24dc	John Plane	1935	DD	72	12	P	S, G	A	H, E	I	Tpc	.5	4,127.23	17.00	Apr. 28, 1948	R1,000	10	160	
-24dd	J. H. Roediger	1941	Dr	97	18	P	S, G	A	T, E	I	Ls	......	4,125.23	16	......	M640	......	80	
-25ac	Fred Shott	1940	Dr	96	18	P	S, G	A	T, E	I	Tc	.7	4,130.73	17.88	Aug. 18, 1947	R1,350	......	149	
-25dc	P. Dones, Jr.	......	Dr	86	16	P	S, G	A	T, E	I	Hpb	1.0	4,137.02	19.20	......do......	M1,190	16	80	
-25dd	D. E. Wind	1915	Dr	85	24	P	S, G	A	T, E	I	Hpb	1.0	4,135.58	18.50	......do......	M1,720	15	320	Eos.
-26bc	Tony Asnicar	1936	Dr	50	16	P	S, G	A	T, E	I	Fs	0	4,126.19	3.40	July 9, 1947	R800	......	60	
-26cd	Mrs. A. Zouple	1946	DD	50	16	P	S, G	A	H, E	I	Tdp	2.4	4,127.12	6.50	......do......	R1,000	......	80	
-27db	Victor Hickman	1947	Dr	56	18	P	S, G	A	T, T	I	Tc	0	4,132.77	4.90	July 7, 1947	R2,000	10	90	S-80.
-27dc	......do......	1937	DD	78	14	P	S, G	A	H, E	I	Tdp	1.5	4,135.59	7.10	July 9, 1947	R1,000	3	70	L.
-27dd	M. Kostman	1936	DD	87	12	P	S, G	A	H, E	I	Tpc	.8	4,130.74	3.40	July 7, 1947	M650	8	200	
-28bc	Public school	......	Dr	50.6	6	P	S, G	A	N	O	Tc	1.2	4,179.70	37.30	Nov. 5, 1947	......	......	......	
-28ca	B. Peterson	1937	Dr	85	24	P	S, G	A	T, E	I	Hpb	0	4,163.27	25.30	Apr. 26, 1948	R800	15	140	
-28cc	......do......	1946	Dr	76	18	P	S, G	A	T, T	I	Tc	0	4,167.52	22.60	July 7, 1947	......	8	150	Eos.
-28db	......do......	1940	Dr	80	18	P	S, G	A	T, E	I	Idp	.5	4,154.94	19.01	......do......	R1,200	8	150	Do.

-32bc	Carl Walker..........	1937	DD	87	24	P	S,G	A	H,E	I	Tpp	0	4,172.15	25.03	July 5, 1947	R1,400	....	250	Do.
-33aa	B. B. Peterson..........	1925	DD	55	14	P	S,G	A	H,T	I	Tpc	0	4,141.49	5.42	July 7, 1947	R1,500	6	40	
-33ad	......do..........	1911	DD	80	12	P	S,G	A	H,E	I	Tc	-2.5	4,136.92	1.90	.....do..........	R1,500	6	150	
-35cd	F. H. Honebein..........	1937	Dr	88	18	P	S,G	A	T,E	I	Tc	-.8	4,147.99	18.12	July 9, 1947	....	16	111	L.
-35dd	John Pabst..........	1947	DD	89	18	P	S,G	A	T,E	I,O	Tpp	1.3	4,145.14	19.00	.....do..........	R1,800	10	100	
-36ac	Mrs. B. Higgins..........	1946	Dr	....	18	P	S,G	A	T,E	I	Hpb	.5	....	18.16	Dec. 1, 1949	M1,570	....	160	
-36bb	J. C. Howell..........	1939	Dr	90	16	P	S,G	A	T,E	I	Ls	......	....	20	....	M1,160	....	160	L.
-36cd	Fountain & Reichert..	1943	Dr	80	14	P	S,G	A	T,E	I	Ls	......	....	18	....	M1,480	....	280	Eos.
B5-56-35cc	Mr. Melvin..........	1947	Dr	150	....	P	R	P	C,W	S	Tc	.8	4,250.18	47.21	July 5, 1947	....	....	......	S-40.
B5-59-30cd	T. O. Winberg..........	......	Dr	11.0	12	P	S,G	A	C,H	S,O	Tpp	.8	4,369.65	5.00	Sept. 15, 1947	....	....	......	
-34cd	G. Williams..........	......	Du	20.0	....	C	S,G	A	C,G	D,S,O	Tpp	2.2	4,366.37	9.55	Sept. 10, 1947	....	....	......	
B5-60-1dd	Elmer Groff..........	......	Dr	34.5	6	P	S,G	A	N	N	Tc	1.5	....	26.40	Sept. 15, 1947	....	....	......	
-12dc	......do..........	......	Dr	22.5	6	P	S,G	A	C,W	S,O	Tc	1.1	4,466.98	12.90	.....do..........	....	....	......	
-23cd	J. R. Mylander..........	1912	Du	8	72	C	S,G	A	T,E	I	Ds	0	4,421.38	4.19	Dec. 9, 1948	R1,150	3	100	Tdtw.
-23da	......do..........	1915	Du	10	60	C	S,G	A	T,E	I	Ds	0	4,419.40	5.65	.....do..........	R1,150	3	100	Tdtw.
-23db	......do..........	1912	Du	7	60	C	S,G	A	H,T	I	Tpc	-2.0	4,417.29	3.60	.....do..........	R1,150	3	100	Tdtw.

Sedgwick County, Colo.

B10-47-6db	Sprague brothers..........	......	Dr	55	6	P	S,G	A	C,W	S	Tpp	1.0	3,667.78	42.50	July 24, 1949	....	....	......	
B11-44-3ba	Mr. Meline..........	......	Dr	110	6	P	S,G	A	C,W	S	Tpp	1.2	3,508.14	49.76	Nov. 2, 1949	....	....	......	
-4ca	....	......	Dr	....	6	P	......	......	C,W	S	Tc	1.1	3,503.48	43.55	June 9, 1949	....	....	......	
-7cc	H. E. Reichelt..........	......	Dr	....	6	P	S,G	A	C,W	D	Ls	......	3,526.3	30	....	....	....	......	
-8ab	......do..........	......	Dr	....	6	P	S,G	A	C,W	D	Ls	......	3,503.2	50	....	....	....	......	
-18bb	......do..........	......	Dr	....	....	P	S,G	A	C,W	D,S	Ls	......	3,559.9	60	....	....	....	......	
B11-45-2ba	E. G. Goddard..........	1946	Dr	....	18	P	S,G	A	T,E	I	Hpb	1.0	3,533.26	29.20	June 9, 1949	R1,300	9	......	
-2cb	....	......	Dr	....	2	P	S,G	A	P,H	D	Tph	2.5	3,513.23	7.85	June 10, 1949	....	....	......	
-2da	S. A. Young..........	......	Dr	....	6	P	S,G	A	C,W	D	Tpp	.5	3,512.81	16.25	.....do..........	....	....	......	
-3ba	Charles Woodham..........	......	Dr	104	18	P	S,G	A	T,E	I	Hpb	.5	3,543.34	31.05	June 9, 1949	....	....	......	
-4bb	....	......	Dr	....	6	P	S,G	A	C,W	D,S	Tpp	.5	3,538.15	15.10	June 10, 1949	....	....	......	
-4cb	Great Western Sugar Co.	1940	Dr	65	48	P	S,G	A	T,E	I,In	Hwc	1.0	....	......	....	R600	25	10	
-4cc	......do..........	1926	DD	40	12	P	S,G	A	H,E	P,In	Ls	......	....	6	....	R400	....	......	
-5ba	Dr. F. J. Hilderman..	1947	Dr	52	18	P	S,G	A	T,E	I,O	Hpb	.5	3,541.44	12.38	Sept. 17, 1947	R1,650	16	200	Sca.
-6ad	....	......	Dn	....	2	P	S,G	A	C,W	S	Tc	.2	3,528.55	2.20	June 16, 1949	....	....	......	
-6cb	....	......	Dr	....	18	P	S,G	A	T,E	I	Hpb	.5	3,537.64	6.47	Nov. 4, 1949	....	....	......	
-8dd	Mr. Thompson..........	......	Dr	....	6	P	S,G	A	C,H	D	Tc	.3	3,544.18	27.53	June 9, 1949	....	....	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Sedgwick County, Colo.—Continued																		
B11-45-10cd	E. E. Adams	......	Dr	......	6	P	S,G	A	C,W	D,S	Tpp	1.0	3,532.47	17.75	June 9, 1949	......	......	......	
-14bb	A. Dieschliman	......	Dr	57	24	P	S,G	A	T,G	I	Tc	.5	3,540.98	35.35	......do......	R300	20	......	EoBf.
-15bd	M. Dieschliman	......	Dr	......	6	P	R	O	C,W	D	Tc	.8	3,576.90	30.03	......do......	......	......	......	
-18aa	John Burgess	......	Dr	......	6	P	R	O	C,W	D	Tpp	.6	3,579.60	30.10	......do......	......	......	......	Sca.
B11-46-1ba	Gus Hereford	1947	Dr	40	18	P	S,G	A	T,E	I	Tc	0	3,554.52	12.92	June 25, 1948	R1,100	......	140	
-3ad	......	......	Dr	......	6	P	S,G	A	C,H	D	Tc	.5	3,565.14	9.16	June 16, 1949	......	......	......	
-3ba	......	......	Dr	......	6	P	S,G	A	C,H	D	Tpp	.3	3,602.59	33.60	......do......	......	......	......	
-3cb	K. Otsuka	1940	Dr	49	18	P	S,G	A	T,T	I	Tc	1.0	3,583.95	13.44	June 24, 1948	R400	......	80	
-5ad	......	......	Dr	......	6	P	S,G	A	N	N	Tc	1.0	3,602.17	20.45	June 16, 1949	......	......	......	
-5bc	Mr. Mussey	1949	Dr	60	6	P	S,R	D,B	J,E	D	Ls	......	3,660.2	35	......	......	......	......	Sca, EoBf.
-5cd	Floyd Utter	1947	Dr	55	18	P	S,G	A	T,T	I	Hpb	1.8	3,613.13	26.35	June 25, 1948	R500	......	80	
-7aa	Erwin H. Schulz	1946	Dr	52	18	P	S,G	A	T,E	I	Hpb	.7	3,609.49	18.92	July 8, 1948	R900	......	65	EoBf.
-9ab	......	......	Dr	......	6	P	S,G	A	C,W	D	Tpp	1.0	3,580.08	16.90	June 16, 1949	......	......	......	
-9dc	J. Jankovsky	1946	Dr	40	18	P	S,G	A	T,T	I	Hpb	1.2	3,568.78	5.85	June 24, 1948	R1,000	......	30	EoBf.
-12cc	Mr. Wolcott	......	Dr	......	6	P	S,G	A	C,W	D	Tpp	.5	3,555.61	13.28	June 9, 1949	......	......	......	
-18ba1	Will Bogenhagen	1934	DD	36	12	P	S,G	A	H,G	I	Tpc	1.0	3,594.67	10.71	June 24, 1948	R200	......	5	
-18ba2	Town of Sedgwick	......	DD	29	10	P	S,G	A	H,E	P	Ls	......	......	10	......	R200	......	......	Bw-3.
-18bb	Tony Manuello	1946	Dr	55	18	P	S,G	A	T,T	I	Tc	0	3,606.10	15.72	June 24, 1948	R1,350	25	120	EoBf.
-18db	W. R. Bennison	1943	Dr	67	18	P	S,G	A	T,E	I,O	Hpb	.5	3,583.88	7.68	Dec. 13, 1947	M1,225	10	46	Sca.
-19bc	Fred Gibson	......	Dr	70	18	P	S,G	A	T,E	I	Ls	......	......	9	......	R2,000	15	120	
-20cb	Town of Sedgwick	......	DD	......	6	P	S,G	A	H,E	P	Fs	0	3,592.36	17.02	June 25, 1948	......	......	......	Bw-7, Sca.

-30bb	F. B. Faimon........	....	Dr	60	6	P	S,G	O	C,W	D,S	Ls	......	3,621.5	46	....	....	....	......	Sca.
B11-47-1cc	Frank Jenik..........	....	Dr	....	6	P	R	O	C,W	D	Tpp	0	3,670.78	34.50	May 24, 1949	....	....	......	
-1dd	David Reuter..........	....	Dr	....	6	P	R	O	J,E	D	Ls	......	....	47	....	....	....	......	
-8dd	Delos Parker..........	....	Dr	100	6	P	R	O	C,W	D	Ls	......	3,712.3	57.50	May 24, 1949	....	....	......	
-13ab	T. Shinamoto..........	1946	Dr	52	18	P	S,G	A	T,T	I	Ls	......	3,612.4	20	June 24, 1948	R1,200	....	150	
-13ba	J. Jenik................	1946	Dr	56	.....	P	S,G	A	T,T	I	Hpb	1.0	3,612.53	13.99	June 25, 1948	R900	....	80	
-13cb	....	....	Dr	....	6	P	S,G	A	C,H	D	Tpp	0	3,594.69	2.40	May 24, 1949	....	....	......	
-14ac	Claire White..........	1946	Dr	60	18	P	S,G	A	T,E	I	Ls	......	....	20	....	R500	....	160	EoBf.
-15aa	....	....	Dr	....	6	P	S,G	A	C,W	D	Tpp	1.5	3,671.86	37.55	Nov. 4, 1949	....	....	......	
-15dd	....	....	Dr	....	6	P	S,G	A	C,H	D	Tpp	0	3,607.72	1.90	May 25, 1949	....	....	......	
-16cd	....	....	Dr	....	.....	P	S,G	A	N	N	Tc	1.0	3,640.42	5.80	June 15, 1949	....	....	......	
-16dd	Public school..........	....	Dr	....	6	P	S,G	A	C,H	D	Tpp	0	3,625.93	8.95	May 24, 1949	....	....	......	
-20bc	Mr. Sidel................	....	Dr	....	6	P	S,G	A	C,E	D	Tpp	.5	3,681.37	48.20	May 25, 1949	....	....	......	
-21ab	Mr. Mentor..............	....	Du	....	.....	.....	S,G	A	H	I	Ls	......	3,634.4	2	June 15, 1949	....	....	......	
-21bb	......do.................	....	Dr	....	6	P	S,G	A	C,H	D	Tpp	.7	3,652.16	7.50	May 24, 1949	....	....	......	
-21db	Arthur Lowes..........	1946	Dr	51	.....	P	S,G	A	T,T	I	Tc	2.0	....	15.19	June 25, 1948	R1,200	15	140	EoBf.
-24ab	W. Stierlen............	....	Dr	50	18	P	S,G	A	T,E	I	Ls	......	3,602.5	9	....	R1,600	....	50	
-24bc	......do.................	1945	DD	34	18	P	S,G	A	H,G	I	Ls	......	3,604.0	9	....	R800	9	20	
-24cc	Leo Munson............	1944	Dr	52	18	P	S,G	A	T,T	I	Ls	......	3,602.5	10	....	R1,100	16	50	
-24dd	E. W. Meineke........	1945	Dr	52	18	P	S,G	A	T,T	I	Hpb	1.0	3,608.95	23.55	June 25, 1948	R900	....	65	EoBf.
-27dd	R. Toyne................	....	Dr	....	6	P	S,G	A	N	N	Tc	.5	3,637.24	36.50	May 24, 1949	....	....	......	
-28ab	James Jankovsky.......	....	Dr	40	24	P	S,G	A	T,G	I	Tc	0	3,621.53	7.67	June 24, 1948	R330	....	30	EoBf.
-28bb	W. C. Davidson.......	1944	Dr	52	24	P	S,G	A	T,T	I,O	Tc	.5	3,624.42	3.01	......do...........	M760	14	60	EoBf, Sca.
-28bc	James Jankovsky.......	....	Dr	40	16	P	S,G	A	T,T	I	Ls	......	3,620.8	6	....	R700	....	43	EoBf.
-28cb	......do.................	1946	Dr	40	18	P	S,G	A	T,T	I	Hpb	1.0	3,622.17	3.85	Mar. 2, 1949	R1,350	....	......	Do.
-29cb	G. B. Crowfoot........	1947	Dr	38	18	P	S,G	A	T,T	I	Tc	1.0	3,631.02	2.33	June 15, 1949	R800	....	......	
-30aa	....	....	Dr	....	10	W	S,G	A	C,H	D	Tpp	1.0	3,632.56	3.95	May 25, 1949	....	....	......	
-31bb1	Alex Lei.................	1937	Dr	39	48	P	S,G	A	T,D	I	Fs	.5	3,640.81	2.51	June 24, 1948	R1,800	....	175	Bw-2.
-31bb2	......do.................	1946	Dr	42	18	P	S,G	A	T,D	I	Ls	......	....	3	....	R2,000	....	200	Bw-3, EoBf.
B12-43-19ca	F. Porter................	1948	Dr	84	18	P	S,G	A	T,T	I	Hpb	0	3,447.19	28.05	Oct. 25, 1948	R1,200	12	......	
B12-44-19da	H. C. Spillman........	1946	Dr	93	18	P	S,G	A	T,E	I	Hpb	1.5	3,542.54	57.54	Jan. 16, 1948	R700	19	100	
-25aa	Public school..........	....	Dr	....	6	P	S,G	A	C,W	D	Tpp	.5	3,467.44	46.50	June 9, 1949	....	....	......	
-26ad	Mr. Behymeir..........	....	Dr	37	6	P	S,G	A	C,W	S	Tpp	.5	3,456.35	24.50	......do...........	....	....	......	
-27bc	Sedgwick County......	1942	Dr	30	24	P	S,G	A	H,E	S,O	Tc	-1.0	3,452.41	2.64	Sept. 17, 1947	....	....	......	Sca.
-28ca	Town of Julesburg.....	1920	Dr	26.0	18	P	S,G	A	H,E	P,In	Tc	-8.0	3,461.12	2.03	Jan. 15, 1948	....	....	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Sedgwick County, Colo.—Continued																		
B12-44-29ab	L. R. Morley	1941	Dr	76	24	P	S, G	A	T, E	I	Bpb	2.0	3,507.76	38.56	Jan. 22, 1948	R900	15	40	
-29ac	E. W. Perry	1940	Dr	82	36	P	S, G	A	T, E	I	Hpb	.8	3,501.13	31.83	Jan. 15, 1948	R400	9	7	
-29cc	H. E. Reichelt, Jr.	1941	Dr	72	24	P	S, G	A	T, E	I	Tc	1.0	3,495.46	22.96	Jan. 16, 1948	R1,342	6	150	
-30aa	G. H. Thompson	1945	Dr	65	18	P	S, G	A	T, E	I	Tc	1.0	3,528.91	47.08	do	R900	10	80	
-31ba	C. B. McCampbell	1942	Du	58	18	P	S, G	A	T, E	I, O	Tpc	.5	3,508.03	22.87	Sept. 16, 1947	R550	10	20	EoBf.
-31bb	Carl Drake	1946	DD	52	8	P	S, G	A	H, E	I	Tpc	.5	3,512.87	27.43	Jan. 22, 1948	...	...	2	
-34bc	...	...	Dr	...	6	P	S, G	A	C, W	S	Tpp	1.0	3,457.95	14.75	June 9, 1949	...	...	...	
-35cb	...	...	Dr	...	6	P	S, G	A	C, W	S	Tc	1.5	3,512.65	54.67	Nov. 2, 1949	...	...	...	
B12-45-25dd	E. Quinn	1947	DD	35	7	P	S, G	A	H, E	I	Tpc	.5	3,512.04	24.70	Jan. 22, 1948	...	...	6	
-26aa	Town of Julesburg	1935	Dr	71	18	P	S, G	A	N	N	Tpp	2.0	3,561.90	55.72	Jan. 15, 1948	...	...	...	EoBf.
-26ab1	do	1939	Dr	85	12	P	S, G	A	T, E	P	Hpb	1.5	3,558.50	54.62	do	R300	10	...	EoBf, Sca.
-26ab2	do	...	Dr	85	18	P	S, G	A	T, E	P	Hpb	1.2	3,565.65	62.30	do	R290	4	...	EoBf.
-26bd	do	1942	Dr	81	18	P	S, G	A	T, E	P	Hpb	1.4	3,561.86	61.73	do	R330	5	...	Do.
-28ca	F. L. Smith	1937	Dr	24	48	W	S, G	A	T, G	I	Tc	.5	...	12.08	Jan. 23, 1948	R500	12	15	Bw-3, EoBf.
-28cb	V. Sanger	1948	Dr	95	18	P	S, G	A	T, T	I	Hpb	.7	3,560.20	13.25	June 10, 1949	R800	...	...	
-29ad	Town of Ovid	1926	Dr	100	10	P	S, G	A, B	H, E	P	Tmc	2.0	3,562.28	13.45	do	...	...	...	Bw-4, Sca.
-30aa	W. H. Brandt	1920	Dr	100	4	P	S, G	A	C, E	D	Tc	-9.0	...	15.75	Jan. 23, 1948	...	...	...	Bf-30.
-31cb	Carl A. Rees	1947	Dr	55	18	P	S, G	A	T, T	I	Tc	1.5	...	19.95	do	R1,000	14	80	EoBf.

-32ab	J. R. Mason	1938	Dr	70	24	P	S, G	A	T, T	I	Tc	1.0	3, 555.66	14.31	do	......	......	120	
-32cb	J. H. Parker	1947	Dr	51	18	P	S, G	A	T, T	I	Tc	1.5	3, 551.65	15.93	do	......	......	160	
-33ab	Jacob Meirs	1947	Dr	46	18	P	S, G	A	T, E	I	Hpb	.5	3, 549.39	14.20	do	R800	25	90	
-33ba	L. Peterson	1946	Dr	41	18	P	S, G	A	T, E	I	Ls	......	3, 551.5	13.90	do	R900	......	80	Sca.
-33bb	R. Barnett	1947	Dr	49.0	18	P	S, G	A	T, E	I	Tc	1.5	3, 552.00	14.52	Jan. 22, 1948	......	......	80	
-35bb	Jack Widmer	......	Dr	45.0	4	P	S, G	A	C, W	S	Tc	1.0	3, 545.53	32.17	Jan. 16, 1948	......	......	......	
-36bb	do	......	Dr	43.0	4	P	S, G	A	C, W	S	Tc	1.5	3, 525.60	27.40	do	......	......	......	
B12-46-35cd	......	......	Dr	......	6	P	S, G	A	C, H	D	Tpp	0	3, 568.43	15.70	June 16, 1949	......	......	......	
-36bc	J. Urban	......	Dr	......	6	P	S, G	A	C, W	D	Tpp	.7	3, 597.23	25.70	do	......	......	......	

Washington County, Colo.

B1-54-7ab	......	......	Dr	26.4	6	P	S	D	C, W	S	Tc	1.0	4, 471.78	10.54	Oct. 30, 1947	......	......	......	
B5-54-2bc	Ernest Repp	......	Dr	330	6	P	Sh	P	J, E	D	Ls	......	......	8	......	R7	1	......	Sca.
-2bd	do	1940	Dr	100	14	P	S, G	A	T, E	I, O	Tc	0	4, 085.23	11.80	Aug. 28, 1947	R1, 800	......	120	
-5aa	Mr. Skaggs	......	Dr	152	6	P	S, G	A	J, E	D, S	Ls	......	4, 087.85	5	......	......	......	......	S-52, L.
-5bd	F. G. Sager	......	Dr	37	6	P	S	A, D	J, E	D	Ls	......	......	15	......	......	......	......	Eos.
-10cc	Ted Gill	1937	DD	99	24	P	S, G	A	H, E	I	Tpc	1.8	4, 095.99	13.21	Aug. 26, 1947	R1, 500	......	......	
-17bc	do	......	Du	10	......	N	S, G	A	H, E	I	Ls	......	4, 092.4	2	......	R1, 450	......	......	Tw.
-17cc	Jacob Brunkhardt	1937	DD	82	14	P	S, G	A	H, E	I	Tpc	1.0	4, 110.81	14.50	Aug. 21, 1947	R1, 000	......	140	Eos.
-19ac	H. Linker	1920	DD	80	12	P	S, G	A	T, E	I	Bpb	1.0	4, 115.95	13.77	Oct. 7, 1947	R1, 200	8	151	
-19bc	Conrad Schlundt	1944	Dr	73	......	P	S, G	A	T, E	I	Hpb	2.0	4, 122.12	17.30	Apr. 28, 1948	R1, 200	......	150	
-19da	Marie Beneke	......	DD	101	12	P	S, G	A	H, T	I	Tpc	1.0	4, 117.54	18.30	Aug. 21, 1947	R1, 950	......	......	
-20ac	Z. M. Snodgrass	1945	Dr	90	18	P	S, G	A	T, E	I	Hpb	.8	4, 111.94	15.25	Aug. 26, 1947	R1, 200	9	320	
-20bc	Mr. Palmer	1934	DD	90	14	P	S, G	A	H, E	I, O	Tpc	1.2	4, 116.04	15.90	Aug. 21, 1947	M1, 650	......	143	
-20cc	F. W. Segelke	1942	DD	91	......	P	S, G	A	J, E	I	Ds	1.0	4, 118.95	15.10	Aug. 25, 1947	R1, 300	......	100	
-20dc	W. Thomason	......	Dr	81	16	P	S, G	A	T, E	I	......	......	......	......	......	R770	......	142	Eos.
-21bc	H. E. Reickers	1929	Dr	82	14	P	S, G	A	T, E	I	Fs	1.5	4, 113.86	14.85	Oct. 14, 1947	R1, 200	14	150	
-21ca	C. Dailey	1946	Dr	82	18	P	S, G	A	T, E	I, O	Tc	.8	4, 112.91	13.70	Aug. 26, 1947	M1, 280	24	220	Eos.
-22bb	D. W. Rumney	......	Dr	......	6	P	S, G	A	N	N	Tc	1.0	4, 104.18	11.44	Mar. 9, 1949	......	......	......	
-28cb	Fred Norton	1944	Dr	69	18	P	S, G	A	T, E	I	Ls	......	......	11	......	R900	......	150	Eos.
-29bc	Sophia Honebein	1937	Dr	78	18	P	S, G	A	T, E	I	Ls	......	......	18	......	R1, 200	......	225	Do.
-29cb	W. B. Jefferies	1937	Dr	72	24	P	S, G	A	T, E	I	Tc	.8	4, 127.10	12.22	Oct. 14, 1947	R1, 100	29	170	L.
-29dc	......	......	Dr	......	6	P	S, G	A	C, H	D	Tc	0	4, 126.81	9.25	May 19, 1949	......	......	......	
-30ab	Marie Beneke	1937	Dr	104	24	P	S, G	A	T, E	I	Hpb	-.4	4, 123.22	16.89	Aug. 25, 1947	M1, 440	10	200	Eos, Sca.
-30bb	F. L. Ericson	1934	DD	82	......	P	S, G	A	H, E	I	Tpc	.8	4, 127.30	16.90	Aug. 20, 1947	M1, 010	......	120	Eos.
-20cb	J. Roediger	......	Dr	88	16	P	S, G	A	T, E	I, O	Hpb	1.0	4, 131.78	22.00	Aug. 21, 1947	M1, 475	11	290	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
Washington County, Colo.—Continued																			
B5-54-30dc	A. J. Higby........	1937	DD	82	72	.....	S, G	A	T, T	I	Fs	0	4,132.05	14.49	Oct. 14, 1947	R1,358	......	80	
-31bc	R. B. Graham......	1939	Dr	87	16	P	S, G	A	T, D	I	Bpb	.5	4,138.14	17.88	Aug. 20, 1947	M1,360	......	110	
-31cc	Mr. Wickham......	....	Dr	30	.....	P	S, G	A	C, E	D	Ls	......	....	18	Aug. 29, 1947	....	......	......	
-32aa	Mr. Brunkhart......	....	Dr	....	6	P	S, G	A	P, H	S	Tc	.5	4,132.31	13.20	May 9, 1949	....	......	......	
C1-55-5cb	P. Merrill..........	1946	Dr	60	.....	P	S, G	A	T, E	I	Hpb	1.0	4,445.89	28.90	Dec. 11, 1948	R1,000	24	......	Eos.
-6dd	.......do............	1942	Dr	59	18	P	S, G	A	T, E	I	Ls	......	4,451.1	29	....	M590	......	80	Do.
-7ad	Bert McFall..........	1945	Dr	57	.....	P	S, G	A	T, E	I	Hpb	0	4,459.21	28.10	Aug. 8, 1947	R950	......	100	Do.
-7dd	J. Cable............	1946	Dr	54	18	P	S, G	A	T, E	I	Tc	0	4,466.75	26.59	......do..........	R600	......	60	Do.
-8cd1	L. Larsen...........	1945	Dr	50	.....	P	S, G	A	T, E	I	Ls	......	4,463.3	24	....	R600	......	45	Do.
-8cd2	.......do............	1939	Dr	50	.....	P	S, G	A	T, E	I	Tc	0	4,465.48	25.03	Sept. 17, 1947	M390	22	45	Do.
-9cc	J. Blake............	....	Dr	38.5	6	P	S, G	A	C, W	S	Tc	.8	4,476.43	27.02	Aug. 14, 1947	....	......	......	
-17cb	E. Larsen...........	1940	Dr	46	.....	P	S, G	A	T, E	I	Ls	......	4,468.9	23	Aug. 8, 1947	R800	......	80	Eos.
-18cc	Query brothers......	....	Dr	75.0	.....	P	S, G	A	C, W	S	Tc	1.0	4,518.14	68.10	Aug. 14, 1947	....	......	......	
-20aa1	Andrew Blake.......	....	Dr	35	.....	P	S, G	A	T, E	I	Bpb	1.0	4,478.54	18.49	......do..........	....	......	......	Eos.
-20aa2	.......do............	....	Dr	35	.....	P	S, G	A	T, E	I	Ls	......	4,475.9	18	....	....	......	......	Do.
-20aa3	.......do............	....	Dr	40.0	.....	P	S, G	A	T, E	I	Hpb	1.0	4,478.67	22.50	Aug. 14, 1947	....	......	......	Do.
-21bd1	.......do............	....	Dr	41.0	.....	P	S, G	A	T, E	I, O	Tc	3.0	4,484.62	15.20	......do..........	....	.....	......	Do.
-21bd2	.......do............	....	Dr	30	18	P	S, G	A	T, E	I	Bpb	3.0	4,484.73	15.25	Oct. 29, 1947	....	......	......	Do.
-30ad	H. Morgan..........	....	Dr	41	.....	P	S, G	A	C, W	S	Ls	......	....	36	....	....	......	......	Eos, Sam.
C1-56-1aa	Clyde Gamble......	....	Dr	70	6	P	S, G	A	C, W	D, S	Ls	......	4,475.4	50	....	....	......	......	Eos.

-1dd	Henry Niemuth.....	....	Dr	70	6	P	S,G	A	C,W	D,S	Ls	......	4,488.4	50	....	....	......	......	Do.
-24dd	Query brothers.....	....	Dr	51.5	6	P	S,G	A	C,W	S	Tc	1.0	4,520.28	48.50	Aug. 14, 1947	....	......	......	

Weld County, Colo.

B1-61-2cc	....	....	Dr	150	6	P	R	L	C,E	D	Tc	0.7	4,861.19	132.15	Oct. 20, 1947	....	......	......	
-3bb	....	....	Dr	85.0	......	P	R	F	C,W	S	Tpp	1.0	4,789.24	78.50	......do..........	....	......	......	
-4cd	Mr. Halligan.......	....	Dr	79.0	......	P	S,G	A	C,W	D,S	Tpp	0	4,802.86	69.50	......do..........	....	......	......	
-5cc	Lyle Cooksey.......	....	Dr	71.0	......	P	S,G	A	T,G	I	Hpb	0	4,782.77	21.75	Oct. 21, 1947	....	......	160	Eos.
-5dc	Charles Hlad.......	1940	Dr	55	36	P	S,G	A	T,E	I	Ls	......	4,773.3	24	....	....	......	105	
-7aa	G. F. Conroy.......	....	Dr	56	24	P	S,G	A	T,E	I	Tpp	0	4,789.62	21.70	Oct. 21, 1947	....	......	60	Eos.
-7cd	C. M. Roark.......	1927	Dr	35	12	T	S,G	A	N	O	Tc	.5	4,806.78	21.20	Sept. 19, 1947	....	......	......	
-7dc	W. Wahl...........	1935	Dr	76	18	P	S,G	A	T,E	I	Hpb	1.0	....	23.26	Dec. 16, 1948	....	......	100	Eos.
-8bc	Ray Sheldon........	....	Dr	96	......	P	S,G	A	T,E	I	Ls	......	4,789.2	23	....	R1,200	......	96	Do.
-9cb	William Moorhead.	1947	Dr	70	......	N	S,G	A	N	N	Ls	......	....	53	....	....	......	......	
B1-62-2ac	Mr. Peterson........	......	Dr	38	6	P	S	A	C,W	D,S	Ls	......	4,893.8	37	....	....	......	......	
-2cd	.......do..............	......	Dr	400	6	P	R	P?	C	S	Ls	......	4,907.9	184	....	....	......	......	
-3cc	Vincent Bucholz....	......	Dr	320	6	P	R	F	C,W	D	Tc	0	4,921.49	249.25	Dec. 9, 1949	....	......	......	
-5aa	John Bucholz........	1947	Dr	190	6	P	R	L?	J,E	D	Ls	......	4,840.6	90	....	R30	50	......	Sca.
-8bb	C. M. Roark........	....	Dr	49.5	10	P	S,G	A	N	O	Tc	.2	4,801.73	33.19	Oct. 21, 1947	....	......	......	
-11cb	H. H. Duff..........	....	Dr	400	6	P	R	P?	......	D	Ls	......	....	186	....	....	......	......	
-12aa	John Roark..........	....	Dr	242	......	P	R	F	C	S	......	......	....	186	....	....	......	......	
-13ad	C. M. Roark.......	1944	Dr	76	18	P	S,G	A	T,E	I,O	Hpb	3.0	4,824.09	26.07	Sept. 19, 1947	M1,325	12	300	Sca, Eos.
B1-63-2bc	C. F. Chambers....	1933	Dr	86	14	P	S,G	A	T,E	I	Ls	......	4,832.5	55	....	R310	......	......	Eos.
-2cc	Mrs. Marie Trupp..	....	Dr	80	14	P	S,G	A	N	O	Tc	0	4,846.06	60.32	Aug. 31, 1948	....	......	......	Ari.
-2dd1	H. Scheid...........	....	Dr	53	12	P	S,G	A	C,H	D,O	Tc	.8	4,832.29	44.47	Sept. 19, 1947	....	......	......	
-2dd2	.......do..............	1945	Dr	80	24	P	S,G	A	T,T	I	Tc	0	4,832.53	42.79	Aug. 17, 1948	....	......	......	
-3ac	C. V. Maddux......	1937	Dr	130	48	P	S,G	A	T,E	I	Bpb	.5	4,833.27	56.81	Aug. 31, 1948	R1,120	......	160	
-3bc	Layde Denner.......	1936	Dr	128	18	P	S,G	A	T,E	I	Tc	2.0	4,842.45	62.49	......do..........	R1,000	......	160	L.
-3cc	John Baumgardner..	1942	Dr	128	18	P	S,G	A	T,E	I,O	Tc	1.5	4,844.79	53.82	Sept. 19, 1947	M1,080	14	80	
-3cd1	Mrs. Marie Trupp..	1941	Dr	116	24	P	S,G	A	T,E	I	Bpb	1.5	4,841.62	57.43	Aug. 31, 1948	R1,000	......	100	
-3cd2	Charles Baumgardner.	1948	Dr	132	18	P	S,G	A	T,E	I	Hpb	2.0	4,851.94	65.22	......do..........	R1,000	......	80	
-3da	Leonard Baumgardner.	1944	Dr	129	24	P	S,G	A	T,E	I	Tc	0	4,833.07	57.09	Aug. 17, 1948	R800	......	80	
-3dc	Fred Huwa..........	1938	Dr	128	18	P	S,G	A	T,E	I	Ls	......	....	60	....	M727	......	80	Eos.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Weld County, Colo.—Continued										
B1-63-3dd1	Mrs. Marie Trupp..	1938	Dr	110	24	P	S, G	A	T, E	I	Ls	....	....	60	....	....	......	60	
-3dd2	Florence Bowles.....	1943	Dr	97	18	P	S, G	A	T, E	I	Tc	2.0	4,842.42	60.10	Aug. 31, 1948	R500	......	80	S-102.
-4ac	Merle Dunham......	....	Dr	85	24	P	S, G	A	T, T	I	Tc	0	4,836.71	43.35	Aug. 17, 1948	R290	......	110	
-4ad	W. M. Kuhrt........	1942	Dr	106	24	P	S, G	A	T, E	I	Hc	.5	4,838.70	52.69	......do...........	R700	5	70	
-4ca	George Anderson....	1938	Dr	110	24	P	S, G	A	T, E	I	Hpb	2.0	4,851.98	57.70	Sept. 16, 1948	R900	15	150	Eos.
-4db	Roy Quimby.........	1938	Dr	127	24	P	S, G	A	T, E	I	Hpb	1.0	4,847.60	56.64	Oct. 26, 1948	R1,710	16	200	
-4dd	J. W. Baumgardner.	1943	Dr	126	18	P	S, G	A	T, E	I	Hpb	1.0	4,847.39	62.81	Aug 31, 1948	M1,003	6	80	
-9ad1	Alex Baumgardner..	1937	Dr	128	24	P	S, G	A	T, E	I	Tc	0	4,852.68	53.21	Sept. 16, 1948	R900	......	80	L.
-9ad2	David Baumgardner.	1939	Dr	120	24	P	S, G	A	T, E	I	Ls	....	....	54	....	M1,270	36	80	
-9ca	Anderson & Pluss.....	1944	Dr	124	24	P	S, G	A	T, E	I	Tc	1.0	4,861.09	54.59	Sept. 16, 1948	M1,300	13	200	Eos.
-9dd	O. B. Shacklee.....	1935	Dr	120	18	P	S, G	A	T, D	I, O	Tc	.8	4,863.08	54.84	Sept. 19, 1947	M924	16	160	
-10aa	J. C. Wagner........	1944	Dr	147	18	P	S, G	A	T, E	I	Bpb	2.0	4,855.86	65.15	Sept. 20, 1948	M1,025	10	80	
-10ba1	........do..............	1945	Dr	147	18	P	S, G	A	T, E	I	Bpb	1.5	4,862.02	69.80	Oct. 26, 1948	M985	17	80	Eos.
-10ba2	Alex Baumgardner..	1946	Dr	152	18	P	S, G	A	T, E	I	Hpb	1.0	4,867.81	79.17	Sept. 21, 1948	M935	9	60	Do.
-10bd	Ruben Baumgardner	1940	Dr	130	24	P	S, G	A	T, E	I	Bpb	1.0	4,857.72	62.14	......do...........	M1,016	10	80	
-10cd	Lee Alden............	1933	Dr	139	48	P	S, G	A	T, D	I, O	Hpb	1.0	4,866.34	60.70	Sept. 19, 1947	M1,060	......	100	L.
-10db	H. J. Vogel..........	1943	Dr	141	18	P	S, G	A	T, E	I	Hpb	1.3	4,852.62	58.46	Sept. 20, 1948	R1,100	......	320	Eos.
-10dc1	........do..............	1938	Dr	143	22	P	S, G	A	T, E	I	Bpb	1.0	4,863.30	59.20	Oct. 26, 1948	R1,200	16	160	
-10dc2	........do..............	1933	Dr	115	18	P	S, G	A	T, E	I	Hpb	.5	4,865.78	60.17	Aug. 13, 1948	M1,370	15	160	
-13cc	C. Klausner..........	....	Dr	40.5	6	P	S, G	A	C, H	S	Tc	.6	4,880.46	25.40	Oct. 26, 1948	....	......	....	Sca.
-15ac	James Whedby.......	1937	Dr	149	24	P	S, G	A	T, D	I	Ls	....	....	71	....	R890	......	150	

-15cc	Fred Huwa	1933	Dr	147	18	P	S, G	A	T, E	I	Hpb	1.0	4,901.60	76.08	Sept. 27, 1948	R1,300	......	180	Eos, L.
-15cd	......do......	1944	Dr	144	18	P	S, G	A	T, E	I	Hpb	2.0	4,896.67	74.19	......do......	R920	12	160	Eos.
-15dc1	F. Kluver	1941	Dr	157	24	P	S, G	A	T, E	I, O	Bpb	.6	4,907.20	82.35	Oct. 8, 1947	M755	16	143	L.
-15dc2	......do......	1933	Dr	157	18	P	S, G	A	T, E	I	......	......	......	......	......	M958	......	142	
-16ac	Alex Greenemeyer	1933	Dr	108	48	P	S, G	A	T, E	I	Ls	......	4,883.0	68	......	M700	......	74	
-16ad	J. M. Alden	1940	Dr	140	24	P	S, G	A	T, E	I	Hwc	.6	4,887.46	69.13	Sept. 21, 1948	M957	15	120	Eos.
-16bd	F. H. Bush	1947	Dr	103	18	P	S, G	A	T, E	I	Hpb	1.0	4,881.88	62.78	Sept. 27, 1948	M684	16	100	
-16dd	M. A. Gibson	1943	Dr	148	18	P	S, G	A	T, E	I	Tc	1.0	4,900.89	73.56	......do......	M1,045	23	100	Eos.
-22ac1	Stanley Walters	1944	Dr	172	24	P	S, G	A	T, E	I	Hpb	1.0	4,905.95	77.14	Oct. 26, 1948	M1,100	22	240	Do.
-22ac2	Ben Gregg	1944	Dr	165	24	P	S, G	A	T, E	I	Bpb	.5	4,910.35	81.43	Sept. 28, 1948	R1,400	17	190	Eos, L.
-22ad	......do......	1940	Dr	169	18	P	S, G	A	T, E	I	Ls	......	......	90	......	R1,300	......	240	
-22bc	J. J. Suppes	1944	Dr	147	18	P	S, G	A	T, E	I	Hpb	1.5	4,914.02	83.81	Sept. 28, 1948	R1,000	10	110	Eos.
-22dd	H. P. Schreider	1937	Dr	176	18	P	S, G	A	T, E	I, O	Hpb	1.1	4,925.34	86.15	Sept. 19, 1947	M1,140	13	160	
-26cb	F. V. Bell	1948	Dr	103	6	P	S, G	A	C, H	D	Tc	.5	4,939.93	84.20	Sept. 28, 1948	......	......	......	Eos.
-27cb	Vester Carder	1946	Dr	159	18	P	S, G	A	T, E	I	Tc	1.5	4,949.80	98.47	......do......	R900	......	320	Eos, L.
-27cd	J. Jackson	1947	Dr	185	18	P	S, G	A	T, E	I	Hpb	2.0	4,948.16	96.37	......do......	R1,000	......	150	Eos.
-27db	P. A. Jackson	1937	Dr	172	18	P	S, G	A	T, E	I	Tc	1.0	4,945.80	96.11	......do......	M1,043	39	100	Eos, Sca.
-27dc	W. C. Vogt	1936	Dr	173	18	P	S, G	A	T, E	I, O	Tc	1.3	4,946.15	95.53	Oct. 8, 1947	R1,080	18	100	Eos.
-28ab	Hudson Gardens Co.	......	Dr	......	12	P	S, G	A	N	O	Tc	.3	4,927.11	73.09	Sept. 22, 1947	......	......	......	
-34bb	Alton Belts	1948	Dr	153	18	P	S, G	A	T, E	I	Hpb	.5	4,971.24	107.24	Sept. 13, 1948	R1,150	12	160	Eos.
B2-61-2ac	F. Otteson	1938	Dr	80	24	P	S, G	A	T, E	I	Tc	1.0	4,636.48	26.60	Dec. 22, 1947	R1,000	......	145	Do.
-2cc	......do......	1946	Dr	86	18	P	S, G	A	T, E	I	Hpb	.5	4,639.00	24.70	......do......	R1,300	......	80	Do.
-11bd1	V. Westhoff	1940	Dr	80	18	P	S, G	A	T, E	I	Tc	2.0	......	23.65	......do......	M810	19	80	
-11bd2	......do......	1947	Dr	68	18	P	S, G	A	T, E	I	Tc	1.5	......	21.80	......do......	M1,120	26	80	S-78.
-11cc	Epple & Weigele	1938	Dr	62	24	P	S, G	A	T, E	I	Bpb	1.0	4,669.59	23.09	Nov. 5, 1947	M780	15	100	Eos.
-11cd	Edward Epple	1946	Dr	63.0	5	P	S, G	A	C, W	S, O	Tc	1.5	4,671.48	27.94	......do......	......	......	......	Do.
-14bc	Mrs. N. Sellers	1942	Dr	84	4	P	S	D	C, W	D, S	Tc	.2	4,701.09	47.86	......do......	......	......	......	
-15aa	S. Neal	1934	Dr	47	16	P	S, G	A	T, E	I	Hpb	0	4,677.98	25.39	Apr. 29, 1948	R360	......	60	
-31dd	Mr. McCoad	......	Dr	......	6	P	S, G	A	C, W	D	Tpp	.5	4,762.82	20.60	Apr. 12, 1948	......	......	......	
-32cc	Louis Sirios	......	Dr	55	30	P	S, G	A	T, E	I, O	Tc	.5	4,760.78	21.45	Sept. 19, 1947	R1,100	9	160	Eos.
-32dc	Caroline Wahl	1930	Dr	50	60	C	S, G	A	T, G	I	Bpb	0	4,760.01	22.38	Dec. 16, 1948	R1,200	......	100	
-36cc	......	......	Dr	......	6	P	R	L, F	N	N	Tc	.6	4,847.69	164.52	Sept. 19, 1947	......	......	......	
B2-62-1aa	......	......	Dr	......	8	P	R	L	C, W	S	Tc	1.0	4,723.50	58.70	May 17, 1949	......	......	......	
-4bd1	Painter Hereford Co.	......	Dr	......	8	P	S, G	A	C, W	S	Tc	0	4,699.42	17.00	......do......	......	......	......	
-4bd2	......do......	......	Dr	......	8	P	S, G	A	C, W	S	Tc	0	4,691.05	7.15	......do......	......	......	......	
-6ca	C. B. & Q. RR. Co.	1918	Dr	104+	4	P	R	F	F	D	......	......	......	......	Aug. 31, 1948	M1.3	......	......	Sca.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Weld County, Colo.—Continued										
B2-62-6cb1	Oliver Warden.......	1945	Dr	72	6	P	S, G	A	H,G	D, S, I, O	Tc	0.8	4,712.06	12.78	Nov. 6, 1947	....	......	......	
-6cb2	Painter Hereford Co.	....	Dr	....	6	P	S, G	A	C, W	D, S	Ls	....	4,715.0	15	....	....	......	......	Sca.
-7cc	Damon Harmon.......	1947	Dr	92	18	P	S, G	A	T, E	I, O	Bpb	1.5	4,735.01	21.00	Sept. 23, 1947	R1,200	17	65	
-17bc	H. Preston............	....	Dr	....	6	P	S, G	A	C, W	S	Tph	6.0	4,733.32	16.12	July 22, 1948	....	......	......	
-18ab	......do................	1944	Dr	82	18	P	S, G	A	T, E	I	Bpb	.2	4,731.28	19.20	Aug. 5, 1948	M1,350	16	100	L.
-18cb	Sadie M. Knox.......	1935	Dr	78	24	P	S, G	A	T, E	I, O	Hpb	.2	4,746.46	25.28	Sept. 23, 1947	M622	......	200	
-18cc	Damon Harmon......	1943	Dr	101	18	P	S, G	A	T, E	I	Hpb	1.5	4,750.90	28.50	......do..........	R1,100	......	20	
-19cd	M. A. Shoeneman...	1942	Dr	87	18	P	S, G	A	T, E	I, O	Tc	1.1	4,765.22	39.75	......do..........	M844	22	140	Eos, Sca, Pt.
-19dd	State of Colorado....	....	Dr	88.0	6	P	S, G	A	C, W	S	Tpp	0	4,756.89	30.14	July 22, 1948	....	......	......	
-30ba1	Stanley Dahlberg....	1945	Dr	90	18	P	S, G	A	T, E	I	Tc	.5	4,766.97	42.35	Oct. 15, 1948	M475	20	90	
-30ba2	......do................	1937	Dr	86	18	P	S, G	A	T, T	I	Hc	.2	4,768.09	45.00	July 22, 1948	....	......	......	U-1.
-30bd	......do................	1944	Dr	90	24	P	S, G	A	T, E	I	Tc	1.0	4,771.91	46.47	Oct. 15, 1948	M415	24	60	
-30cb	Fred Gunzelman......	1937	Dr	80	48	P	S, G	A	T, E	I	Bpb	0	4,776.77	48.25	July 22, 1948	R800	......	......	U-1, L.
B2-63-2cc	John Zimbleman.....	1944	Dr	81	24	P	S, G	A	T, E	I	Fs	1.3	4,731.77	15.37	Aug. 5, 1948	M905	30	140	Eos, Sca.
-15bb	......do................	1925	Dr	40.5	6	P	S, G	A	C, W	S	Tc	.5	4,751.56	13.21	July 23, 1948	....	......	......	
-15dc	Mrs. Sadie Knox.....	1940	Dr	93	18	P	S, G	A	T, E	I, O	Bpb	1.4	4,762.12	27.72	Oct. 9, 1947	M732	21	100	Eos.
-21aa	John Zimbleman......	....	Dr	40.5	6	P	S, G	A	C, W	S	Tc	0	4,765.99	18.54	July 30, 1948	....	......	......	
-22aa	......do................	1944	Dr	85	18	P	S, G	A	T, E	I	Hpb	2.0	4,762.76	25.99	Oct. 26, 1948	R1,000	23	180	Eos.
-22ac	Henry Zimbleman....	1936	Dr	96	18	P	S, G	A	T, E	I	Hpb	0	....	31.55	......do..........	R1,300	24	200	Do.
-22ad	......do................	1939	Dr	80	24	P	S, G	A	T, E	I	Hpb	.5	4,721.91	32.45	......do..........	M970	30	160	Do.

-22cc	H. O. Milcap	1936	Dr	87	18	P	S, G	A	T, E	I, O	Hpb	.7	4,784.48	36.10	Sept. 23, 1947	M880	17	40	
-22cd	William M. Hoff	1944	Dr	95	18	P	S, G	A	T, E	I	Hpb	.7	4,780.92	37.56	July 23, 1948	R1,500	......	100	
-22dc	John Zimbleman	1933	Dr	102	24	P	S, G	A	T, E	I, O	Hpb	1.0	4,785.73	42.54	Sept. 23, 1947	M1,095	......	160	Eos.
-23cc	George Zimbleman	1940	Dr	119	24	P	S, G	A	T, E	I	Hpb	1.0	4,781.90	41.20	Oct. 26, 1948	M947	26	200	
-23cd	Peter Zimbleman	1947	Dr	117	20	P	S, G	A	T, E	I	Hpb	1.0	4,780.23	41	......	M1,010	23	160	
-23dc	E. Weickum	1944	Dr	79	24	P	S, G	A	T, E	I, O	Hpb	1.5	4,787.78	49.10	Sept. 22, 1947	M500	23	......	
-25ab1	C. Eckhardt	1940	Dr	75	18	P	S, G	A	T, E	I	Ls	......	......	40	......	M795	......	80	L.
-25ab2	......do......	1945	Dr	80	18	P	S, G	A	T, E	I	Hpb	.5	4,776.19	43.10	July 26, 1948	M1,045	15	80	Sca.
-25cc1	Irvin Sargent	1937	Dr	74	24	P	S, G	A	T, E	I	Tc	0	4,791.07	50.64	Aug. 5, 1948	M432	7	40	Eos, Sca.
-25cc2	......do......	1940	Dr	70	14	P	S, G	A	T, E	I	Ls	......	4,791.5	50	......	R275	......	30	Eos.
-25cc3	......do......	1945	Dr	78	24	P	S, G	A	T, E	I	Hpb	1.0	4,790.90	52.76	Aug. 5, 1948	M596	10	80	Do.
-25cc4	......do......	1940	Dr	72	8	P	S, G	A	T, E	I	Ls	......	......	50	......	M143	......	20	Do.
-25db1	Herman Scheid	......	Dr	61	24	P	S, G	A	T, E	I	Tc	1.0	4,778.70	43.34	Oct. 26, 1948	R400	6	90	
-25db2	......do......	......	Dr	61	18	P	S, G	A	T, E	I	Hpb	1.5	4,777.65	43.15	......do......	R300	6	70	
-26ad1	F. F. Cuykendall	1941	Dr	122	24	P	S, G	A	T, E	I	Tc	.7	4,789.50	......	......	M840	13	125	Eos, L.
-26ad2	......do......	1933	Dr	128	20	P	S, G	A	T, D	I	Hpb	.5	4,789.08	50.33	July 27, 1948	R420	......	135	
-26bd	John Mitzel	1935	Dr	101	24	P	S, G	A	T, E	I	Hpb	.5	4,794.72	......	......	M886	15	189	
-26cd1	Ada Elmore	1944	Dr	128	18	P	S, G	A	T, E	I	Hpb	1.0	4,805.49	64.31	Aug. 6, 1948	M600	5	78	Eos.
-26cd2	H. J. Elmore	1945	Dr	132	18	P	S, G	A	T, E	I	Hpb	1.0	4,805.16	59.89	......do......	M933	15	82	Do.
-26dc	William Carlson	1940	Dr	95	24	P	S, G	A	T, E	I	Ls	......	4,802.9	60	......	M970	......	160	
-26dd	E. L. Keller	1940	Dr	70	16	P	S, G	A	T, E	I	......	......	......	......	......	M665	......	70	
-27ac	George Weickum	1944	Dr	127	24	P	S, G	A	T, E	I	Hpb	.6	4,793.32	48.93	Oct. 15, 1948	M866	16	80	
-27ad	......do......	1934	Dr	102	24	P	S, G	A	T, E	I	Hpb	.5	4,792.46	45.71	Aug. 6, 1948	R800	16	80	
-27bc	C. B. McCormick	1938	Dr	87	24	P	S, G	A	T, E	I	Hpb	2.0	4,791.80	41.92	Oct. 15, 1948	M853	15	125	
-27cc	L. B. Cobb	1935	Dr	98	24	P	S, G	A	T, E	I	Hpb	1.5	4,800.67	43.90	......do......	R700	11	80	Eos.
-27cd	Ana Harms	1935	Dr	112	18	P	S, G	A	T, E	I	Hpb	.5	4,809.43	53.33	......do......	M865	11	80	
-27dc	A. Hofferber	1935	Dr	120	18	P	S, G	A	T, E	I	Tc	.5	4,809.11	53.74	......do......	M880	13	80	Eos.
-28bc1	George Hilt	1947	Dr	55	18	P	S, G	A	T, E	I	Tc	1.5	4,790.93	25.92	......do......	M207	16	38	
-28bc2	......do......	......	Dr	55	18	P	S, G	A	T, E	I	Tc	1.0	4,789.17	24.94	......do......	M300	10	30	Eos.
-28dc	C. V. Maddux	1933	Dr	80	24	P	S, G	A	T, E	I	Bpb	2.0	4,807.67	46.40	......do......	M665	16	60	L.
-28dd	......do......	1936	Dr	97	48	P	S, G	A	T, E	I, O	Hwc	1.3	4,801.73	42.22	Sept. 22, 1947	M1,402	21	280	
-31aa	William Hoff	1920	Dr	650	6	P	R	P	J, E	D	Ls	......	......	100	......	......	......	......	Sca.
-32aa	Tony Batelli	1934	Dr	41	30	P	S, G	A	N	O	Tc	.5	4,802.88	31.42	Sept. 22, 1947	......	......	......	
-32da	Merle Dunham	1947	Dr	30	18	P	S, G	A	J, E	D	Ls	......	......	15	......	......	......	......	S-18.
-33ac	H. E. Crow	1937	Dr	74	18	P	S, G	A	T, E	I	Tc	2.0	4,811.57	40.34	Aug. 6, 1948	M735	13	70	
-33ad	Roy Iwanaga	1935	Dr	82	24	P	S, G	A	T, E	I	Hpb	1.5	4,821.08	55.05	Aug. 13, 1948	M558	11	60	
-33dc	Mannual Schwartz	1940	Dr	81	48	P	S, G	A	T, E	I	Hpb	3.0	4,829.94	50.35	Oct. 26, 1948	M874	17	80	Eos.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
								Weld County, Colo.—Continued											
B2-63-33dd1	H. W. Young........	1935	Dr	90	24	P	S, G	A	T, E	I	Hpb	1.0	4, 837.80	62.74	July 30, 1948	M428	.....	35	L.
-33dd2	......do..................	1944	Dr	87	24	P	S, G	A	T, E	I	Tc	2.5	4, 826.41	49.03	Aug. 6, 1948	R950	12	125	Sca.
-34ac	Henry Trupp, Sr......	1946	Dr	128	18	P	S, G	A	T, E	I	....	......	....	....	....	M1, 155	.....	160	
-34bc1	Walter Williams......	1933	Dr	80	48	P	S, G	A	T, D	I	....	......	....	....	....	R400	.....	76	U-1.
-34bc2	......do..................	1939	Dr	91	24	P	S, G	A	T, D	I	Tc	2.0	....	45.54	Oct. 26, 1948	R1, 000	17	80	Eos.
-34bd	Henry Trupp, Sr......	1936	Dr	125	18	P	S, G	A	T, E	I	Ls	......	....	51	....	M860	.....	160	
-34cc	R. L. Martin..........	1937	Dr	105	24	P	S, G	A	T, E	I, O	Tc	.5	4, 830.79	56.24	Oct. 9, 1947	M928	15	100	S-108.
-34dc	......do..................	1948	Dr	105	18	P	S, G	A	T, E	I	Hpb	1.0	4, 827.35	55.54	Oct. 26, 1948	R900	20	120	
-34dd	......do..................	1933	Dr	115	18	P	S, G	A	T, E	I	....	......	....	....	....	M841	27	200	
-35ac1	William Carlson......	1937	Dr	95	24	P	S, G	A	T, E	I	Tc	.3	4, 806.70	56.30	Oct. 26, 1948	R500	8	100	
-35ac2	......do..................	1945	Dr	90	18	P	S, G	A	T, E	I	Hpb	1.5	4, 804.03	50.58	......do...........	M525	9	110	
-35ad1	C. O. Sargent........	1941	Dr	71	24	P	S, G	A	T, E	I	Hpb	1.0	4, 803.10	51.05	Aug. 16, 1948	R405	.....	40	
-35ad2	......do..................	1946	Dr	71	18	P	S, G	A	T, E	I	Hpb	.6	4, 801.98	50.62	......do...........	....	.....	40	Eos.
-35bc	Weicker Investment Co.	1939	Dr	102	24	P	S, G	A	T, E	I	Tc	0	4, 815.39	61.55	......do...........	M1,040	17	160	
-35cc1	Weicker Farms Co...	1939	Dr	115	24	P	S, G	A	T, E	I	....	......	....	....	....	R770	.....	100	
-35cc2	......do..................	1939	Dr	114	24	P	S, G	A	T, E	I	Hwc	.5	4, 825.28	61.50	Aug. 16, 1948	....	8	60	Eos, L.
-35dc	William Carlson.....	1940	Dr	91	24	P	S, G	A	T, E	I, O	Tc	.7	4, 814.95	51.45	Oct. 9, 1947	M660	20	110	S-119.
-36bb1	Martin Scheid.........	1940	Dr	83	24	P	S, G	A	T, E	I	Hpb	1.0	4, 797.59	50.80	Oct. 26, 1948	....	.....	80	Eos.
-36bb2	......do..................	1943	Dr	83	24	P	S, G	A	T, E	I	Hpb	1.0	4, 795.30	49.64	......do...........	M464	14	80	Do.
-36bc	......do..................	1936	Dr	76	24	P	S, G	A	T, E	I, O	Tc	.9	4, 798.30	51.78	Sept. 22, 1947	R340	.....	80	
B3-61-14bd	Mr. Kingsbury.........	....	Dr	90.8	.....	P	S	D	N	O	Tp	4.0	4, 680.97	58.22	Mar. 10, 1948	....	.....	......	

-15ab			Du		4	P	S	D	C,W	S	Tpp	0	4,709.85	86.52	Aug. 9, 1949				
-36ab1	David Bernhardt	1942	Dr			P	S,G	A	T,E	I	Fs	0	4,621.09	38.20	Dec. 22, 1947	R1,200		140	
-36ab2	do.	1949	Dr		18	P	S,G	A	T,E	I						R1,200			
-36ac1	do.	1941	Dr		18	P	S,G	A	T,E	I	Bpb	.3	4,622.55	36.98	Apr. 29, 1948	R900		140	
-36ac2	do.	1949	Dr	93	18	P	S,G	A	T,E	I	Tpp	.5		40.54	Nov. 1, 1949	R1,400			Eos.
-36bc	R. Loose	1937	Dr	108	18	P	S,G	A	T,E	I,O	Bpb	.3	4,628.90	35.60	Dec. 23, 1947	R1,000	25	240	L.
-36cb	do.	1937	Dr	100	24	P	S,G	A	T,E	I	Ls		4,628.9			R1,000		200	
B3-62-15ba	J. E. Painter	1932	Dr	84	24	P	S,G	A	T,G, F	I	Bpb	1.0		5.84		R1,200	35	100	Sca. Well discharges into trench about 5 feet deep.
B4-61-1bb1	C. G. Kreiger	1947	Dr	39.5	6	P	S, G	A	H,G	S,O	Tc	2.0	4,465.29	9.50	Sept. 15, 1947				
-1bb2	do.	1943	Dr	20	6	P	S,G	A	J,E	D	Ls			9					Sca.
-12aa	C. L. Kreiger	1948	Dr	105	18	P	S,G	A	T,D	I	Ls			48		M1,390	8		Eos.
-13db	John Smith	1947	Dr	79		P	S,G	A	T,T	I	Hpb	.8	4,420.55	4.00	Sept. 16, 1947	R1,200		105	Do.
-19dc	F. A. Oliver	1947	Dr	100		P	S,G	A	T,E	I						R900			Ssu.
-20cc	Jack Kingsbury	1947	Dr	136	18	P	S,G	A	T,E	I	Tc	.9	4,490.35	30.15	Sept. 18, 1947				L.
-20cd	M. M. Gardner	1940	Dr	110	20	P	S,G	A	T,E	I	Ls			25		R1,000		140	
-20dc	J. H. Kinkade	1940	Dr	80	24	P	S,G	A	T,E	I	Bpb	1.0	4,484.49	26.85	Sept. 18, 1947	R600		150	
-22dd	R. M. Warner		Dr			P	S,G	A	T,T	I	Bpb	0		10.00	do.				
-26bc	J. T. Warren	1940	Dr	104		P	S,G	A	T,E	I	Fs	1.4	4,481.90	25.05	do.	R1,100	54	100	Eos.
-28bb	K. Mori	1947	Dr	92	18	P	S,G	A	T,E	I,O	Hpb	.8	4,482.28	23.25	do.	M1,330	22	155	Do.
-30ab	Olson & Wheeler	1947	Dr	86.0	24	P	S,G	A	T,E	I,O	Hpb	0	4,492.70	28.05	Sept. 19, 1947				
B4-62-20bd	Mr. Littler		Dr	27.0	6	P	S	D	C,H	D,O	Tpp	0	4,543.97	20.90	Sept. 20, 1947				
-22bd			Dr		6	P	S,G	A	N	N	Tc	1.5	4,550.86	25.30	May 16, 1949				
-24bd	W. J. Cheley	1939	Dr	110	20	W	S,G	A	T,E	I	Tc	1.0	4,472.94	12.45	Sept. 19, 1947	R1,200		340	Eos.
B4-63-2cb	P. J. Croissant		Du	10.0	12	T	S,G	A	C,H	S,O	Tpp	1.3	4,521.00	2.75	do.				
-2cd	do.	1940	Dr	37	24	P	S,G	A	T	I						R700		60	
-3ca	do.	1940	Dr	63	48	P	S,G	A	T,E	I	Hwc	1.0	4,554.30	32.85	Sept. 19, 1947	R1,000		100	Eos.
-3db	do.	1940	Dr	43	24	P	S,G	A	T,E	I	Ls			3		R1,200		100	
-4ab	Archie Parks	1942	Dr	85	18	P	S,G	A	T,E	I,O	Tc	.4	4,563.08	32.10	Sept. 19, 1947	M1,100	14	80	Sca, Eos.
-6bc	Mrs. Gertrude Bengston.	1940	Dr	63	24	P	S,G	A	T,E	I						R880		135	
-6cc	Dr. Hafley	1946	Dr	60.0	16	P	S,G	A	T,E	I	Tc	0	4,608.07	5.90	Sept. 20, 1947			240	
-7cc1	F. Duell	1947	Dr	100	18	P	S,G	A	T,E	I	Ls			21					
-7cc2	H. Duell	1937	Dr	104	18	P	S,G	A	T,E	I	Bpb	1.0	4,621.40	12.80	Sept. 20, 1947	R750		120	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Weld County, Colo.—Continued																		
B5-63-19ab	A. M. Christensen	1940	DD	37	.....	P	S,G	A	V, T	I	Tpc	0	4,554.78	5.10	Sept. 27, 1940	....	.....	25	L.
-26bd	"70" Cattle Ranch	......	Dr	61.0	6	P	S,G	D, A	C,W	S	Tc	1.8	....	16.50	Sept. 12, 1947	....	.....	......	Eos.
-30ad	Mangus Peterson	......	DD	68	18	P	S,G	A	T,T	I	Tpc	0	4,559.09	11.50	Sept. 20, 1947	....	.....	80	
-30bc	Mr. Nelson	......	Dr	70	24	P	S,G	A	T, E	I	Bpb	1.0	4,584.84	31.47	......do......	....	.....	90	
-30cb	Van Calvin	1936	Dr	65	16	P	S,G	A	T, E	I	Ds	1.0	4,584.12	30.60	......do......	....	.....	33	
-31cc	W. F. Rothe	1934	Dr	60	24	P	S,G	A	T	I	Ls	......	4,577	12	....	R545	.....	160	L.
-32bc	George Hart	......	Dr	47.0	24	P	S,G	A	T, T	I, O	Tc	1.0	4,578.16	28.71	Sept. 20, 1947	....	.....	......	
	Deuel County, Nebr.																		
B12-42-1bb	Coil McGreer	1936	Dr	....	24	P	S,G	A	T,T	I	Tpp	0	3,370.64	8.40	Oct. 27, 1948	R700	.....	......	
-1bc	......do......	1937	Dr	....	18	P	S,G	A	T, E	I	......	......	....	....	....	R700	.....	......	
-1cc	T. Reimers	......	Dr	....	36	P	S,G	A	T, E	I	Hpb	.5	3,383.16	11.74	Oct. 27, 1948	R1,200	.....	......	
-1dd	......do......	1928	Dr	74	36	P	S,G	A	T, E	I	Hpb	0	3,389.52	22.54	......do......	R1,100	.....	......	
-2ab	Dwight Palzer	1930	DD	60	72	C	S,G	A	T, E	I	Tc	1.0	3,379.62	11.14	Oct. 26, 1948	R1,000	.....	......	
-2ac	......do......	1946	Dr	76	18	P	S,G	A	T,T	I	Hpb	0	....	9.70	Nov. 9, 1948	R1,050	15	......	Bf-80.
-2ba	E. Caskey	1945	Dr	78	18	P	S,G	A	T,T	I	Tc	1.0	3,379.62	10.39	Oct. 26, 1948	R500	.....	......	EoBf.
-2cb	Allen Southard	1946	Dr	69	18	P	S,G	A	T, E	I	Hpb	.5	3,386.04	8.60	......do......	....	.....	......	L.
-2cd	Samuel McClung	1945	Dr	80	18	P	S,G	A	T, E	I	Hpb	0	3,389.61	12.00	Oct. 28, 1948	R1,200	8	......	EoBf.
-2dd	Daniel McClung	1945	Dr	60	18	P	S,G	A	T, E	I	Hpb	0	3,384.90	10.16	......do......	R1,000	.....	......	L.
-3bd	T. Reimers	1941	Dr	62	.....	P	S,G	A	T,T	I	......	......	....	....	....	R1,150	.....	......	
-3cc	G. H. Ballantine	......	DD	....	72	C	S,G	A	H,E	I	Tpc	0	3,392.18	5.35	Oct. 26, 1948	....	.....	80	Bw-3.

-3dc	T. Reimers	1920	DD	50	72, 24	P	S,G	A	V,T	I	Tpc	.5	3,391.36	9.17	do.	R900			
-3dd	do.	1941	Dr	75		P	S,G	A	T,E	I	Ls		3,389.5	9		R1,100			
-4cc	H. Meekins	1920	DD	48	72	C	S,G	A	T,E	I	Tc	0	3,396.09	4.61	Oct. 26, 1948	R900			
-4dc	O. K. Bayley	1935	Dr	30	18	P	S,G	A	T,T	I	Tc	.5	3,395.71	8.65	do.	R700			
-5db	H. J. Bayley	1947	Dr	21	30	P	S,G	A	T,T	I	Tc	0		7.20	do.	R900			Bw-3, EoBf.
-5dc	do.	1938	Dr	30		P	S,G	A	N	N	Tc	0	3,398.82	6.24	do.				Bw-2, EoBf.
-5dd	do.	1939	Dr	29	18	P	S,G	A	T,T	I	Bpb	.5	3,398.72	6.62	do.	R1,170			EoBf.
-7cc	D. O. Harris	1946	Dr	92		P	S,G	A	T,T	I	Hpb	0	3,415.62	8.75	Oct. 25, 1948	R1,600			L.
-7da	L. Dobson	1925	Dr	50	18	P	S,G	A	T,E	I	Tc	1.0	3,410.81	9.65	Oct. 26, 1948	R800			
-8ab	R. A. Peterman		DD	30	72	C	S,G	A	V,T	I	Tc	0	3,401.41	5.25	do.	R700			
-8dc	W. H. Palzer	1946	Dr	111	18	P	S,G	A	T,T	I	Hpb	1.5	3,415.95	17.25	Oct. 27, 1948	R1,300			
-9ac	Mrs. Boganhagen		Dr	60	24	P	S,G	A	T,E	I	Tc	0		14.14	Oct. 26, 1948	R800			EoBf.
-9bd	John Mentor	1930	Dr		48	P	S,G	A	T,E	I	Tc	0	3,403.46	11.45	Oct. 27, 1948	R400			
-9cc	W. H. Palzer	1946	Dr	160	18	P	S,G	A	T,T	I, O	Hpb	.3	3,427.68	32.25	Sept. 17, 1947	R1,450			EoBf.
-9cd	do.	1944	Dr	80	18	P	S,G	A	T,T	I	Hpb	1.0	3,432.16	37.25	Oct. 27, 1948	R800			
-9db	do.	1938	DD	77	72	W	S,G	A	T,E	I	Tc	1.0		19.08	do.	R1,650	18		
-10ac	A. W. Peterson		Dr	69		P	S,G	A	T,E	I						R1,000			EoBf.
-10bb	do.	1940	Dr	80	18	P	S,G	A	T,E	I	Tc	1.5	3,395.84	11.62	Oct. 26, 1948	R1,500			Do.
-10cc1	E. Pursel	1928	Dr		24	P	S,G	A	T,E	I	Tc	1.0	3,410.09	19.75	do.	R900			
-10cc2	do.	1928	Dr	50	24	P	S,G	A	T,E	I	Tc	.5	3,410.77	19.81	do.	R900	14		
-11ab1	T. Reimers		Dr			P	S,G	A	T,E	I	Tpp	1.0	3,393.87	18.40	Oct. 28, 1948				
-11ab2	do.		Dr		36	P	S,G	A	T,E	I	Tc	0	3,394.55	17.47	do.				
-11ac	do.		Dr		18	P	S,G	A	T,T	I									
-11bb	L. Kimberley		DD	50		P	S,G	A	T,T	I	Tpc	1.0	3,395.79	14.51	Oct. 28, 1948	R1,200			
-11bc	do.	1940	Dr	71		P	S,G	A	T,T	I	Ls			25		R1,200			EoBf.
-12ab	B. H. Skuglund	1938	Dr	71	24	P	S,G	A	T,T	I						R1,200			Do.
-12bc	M. Stewart		Dr	80		P	S,G	A	T,T	I						R800			
-12bd	do.	1945	Dr	107		P	S,G	A	T,T	I	Hpb	0	3,402.82	29.03	Oct. 28, 1948	R1,400			
-14aa			Dr		6	P	R	O	C,W	D	Tpp	1.5	3,455.41	72.10	June 17, 1949				
-15ab			Dr		6	P	R	O	C,H	D	Tpp	0	3,422.74	34.40	do.				
-16cd	George Palzer	1945	Dr	165	18	P	S,G	A	T,T	I	Ls			80		R1,400			EoBf.
-17bc1	A. Neilson		Dr	40	18	P	S,G	A	T,E	I	Tc	1.0	3,417.46	11.45	Oct. 25, 1948	R800	20		Do.
-17bc2	do.	1930	Dr	46	36	P	S,G	A	T,T	I	Hwc	1.0	3,431.12	24.40	do.	R500	20		Do.
-17ca	do.		Dr	74	18	P	S,G	A	T,E	I	Hpb	1.5	3,434.28	31.12	Oct. 26, 1948	R1,500	15		Do.
-18ac	Lyle Dobson		Dr	48	24	P	S,G	A	T,T	I	Tc	.5	3,434.58	26.41	Oct. 25, 1948	R500			L.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Deuel County, Nebr.—Continued										
B12-42-18ba	Lyle Dobson	1945	Dr	38		P	S,G	A	T,E	I	Tc	1.0	3,419.62	12.15	Oct. 25, 1948	R800			EoBf.
B12-43-1ca	Troelstrup Ranch	1946	Dr	60		P	S,G	A	N	N	Tc	0	3,452.06	25.35	June 29, 1949				
-7dd	Victor Bollair		Dr		6	P	R	O	C,W	D,S	Tc	0	3,557.15	46.10	do.				
-10cc	Mr. Johnson		Dn		2	P	S,G	A	C,W	D	Ls		3,452.3	16					
-11cd			Dr		8	P	S,G	A	C,W	S	Tc	1.0	3,425.69	4.18	June 29, 1949				
-13ab	L. Jensen	1935	Dr	50	18	P	S,G	A	T,T	I	Tc	1.0	3,421.81	12.00	Oct. 25, 1948				
-13ad	do.		Dr	40	6	P	S,G	A	C,W	D,S	Tpp	.3	3,429.61	17.75	June 17, 1949				
-16bb	H. MacCormack	1940	Dr	65	24	P	S,G	A	T,G	I	Hpb	1.0	3,487.81	39.08	Jan. 23, 1948	R800	22		
-16bc	do.	1945	Dr	68	18	P	S,G	A	T,G	I	Ls		3,481.1	32		R800	22		
-17cb	Frank Porter	1947	Dr	157	18	P	S,G	A	T,T	I	Hpb	1.0	3,507.10	51.03	Jan. 23, 1948			160	
-17cc	Ernest Smith	1938	Dr	110	24	P	S,G	A	T,E	I	Ls		3,502.5	50		R1,000	20		
-17da	H. G. Alexander		Dr	62	12	C	S,G	A	T,E	I	Tc	2.0	3,465.50	15.52	Jan. 23, 1948				
-18ac1	Wesley Johnson		Dr		24	P	S,G	A	T,E	I	Tc	1.5	3,524.28	58.74	do.		22		
-18ac2	Malcom Carlson	1930	Dr	157	6	P	R	O	N	N	Tc	.3		35.05	do.				
-20bb	E. Smith	1946	Dr	80	12	P	S,G	A	J,E	D									
-21ab	State of Nebraska	1943	Dn	25	2	P	S,G	A	P,H	D,O	Tc	5.5	3,452.11	11.80	Sept. 17, 1947				
-24ba	Peter Jensen	1935	Dr	52	18	P	S,G	A	T,T	I						R500			EoBf, Sca.
-24bb	do.	1946	Dr	78	18	P	S,G	A	T,T	I,O	Hpb	.5	3,442.23	23.58	Sept. 17, 1947	R1,100		80	EoBf.
B12-44-7cb	Don Freeman	1943	DD	26	48	W	S,G	A	H,E	I	Tc	1.0	3,597.82	13.55	Jan. 16, 1948	R1,100			Bw-3.
-13ad	Mrs. Griswold		Dr			P	R	O	C,W	D,S	Tpp	1.5	3,585.12	47.45	June 29, 1949				
-18bb	Paul Ness	1948	Dr	92	18	P	S,G	A,B	T,E	I	Hpb	0	3,590.66	11.85	Dec. 14, 1949	R1,200			Bw-2, EoBf, Sca.

-18cd	H. H. Reese........	......	Dr	38	18	P	S, G	A	T, E	I	Ls	......	3, 579.6	18	....	R750	......	......	
B12-45-2ac	Glenn LaSalle.......	......	Dr	28	......	P	S, G	A	T, T	I	Tc	1.0	3, 621.06	8.42	Jan. 16, 1948	R850	......	50	EoBf.
-11aa	G. Rabe.............	1938	Du	34.0	36-14	P	S, G	A	V, T	I	Tpc	0	3, 617.28	20.40	......do..........	R1,000	......	......	
-12db	Sauterquist Estate....	1947	Dr	32	18	P	S, G	A	T, T	I	Hpb	1.0	3, 598.00	9.60	Dec. 14, 1949	R950	......	......	
-13aa	Mrs. Pheiffer........	1938	Dr	47	......	P	S, G	A	T, T	I	Ls	......	3, 591.3	12	....	R500	......	16	
B13-41-30bd	....	......	Dr	......	4	P	S, G	A	C, W	S	Tc	3.0	3, 442.89	63.66	June 29, 1949	....	......	......	
-31cc	H. J. Bayley.........	1947	Dr	58	18	P	S, G	A	T, T	I	Hpb	.7	3, 370.77	5.70	Oct. 26, 1948	R850	......	......	EoBf.
-31cd1	......do................	1936	Dr	40	......	P	S, G	A	T, E	I, O	Hpb	1.5	3, 372.49	11.38	Sept. 17, 1947	R1,300	......	......	EoBf, Sca.
-31cd2	Neilson Estate........	1937	Dr	39.6	18	P	S, G	A	T, E	I	Ls	......	3, 370.3	9	....	....	......	......	EoBf.
-31cd3	......do................	1938	Dr	26	24	P	S, G	A	T, E	I	Hpb	.8	3, 369.13	9.11	Oct. 27, 1948	....	......	......	Do.
B13-42-25dd1	Town of Big Springs.	1941	Dr	29	18	P	S, G	O, A	T, E	P	Hpb	2.5	....	9.09	......do..........	....	......	......	Sca.
-25dd2	....	......	Sp	......	......	N	R	O, A	F	S	......	......	....	......	....	....	......	......	Do.
-34cc	Martin Zeigler........	1949	Dr	64	6	P	R	O	C, H	D	Tc	0	3, 432.56	38.45	June 29, 1949	....	......	......	
-35ca	Gilbert Grapes........	1947	Dr	37	18	P	S, G	A	T, E	I	Hpb	.5	3, 390.24	13.36	......do..........	....	......	......	Bf-62.
-35cc	Roland LeGrange.....	1947	Dr	30.8	24	P	S, G	A	T, D	I, O	Tc	.8	3, 386.47	8.32	Oct. 1, 1947	R1,250	......	......	Bw-2, EoBf.
-36cb	......do................	1947	Dr	26	32	P	S, G	A	T, E	I, O	Tc	.9	3, 374.91	5.59	Dec. 13, 1947	M380	15	......	Sca.
B13-45-15cc	Town of Chappell....	......	DD	40	18	P	S, G	A	T, E	P, In	Fs	0	3, 695.23	28.01	Jan. 22, 1948	R600	5	......	EoBf.
-16dc	Cy Brown.............	1930	DD	27	......	P	S, G	A	H	I	Idp	1.0	3, 697.28	13.60	Dec. 4, 1949	R1,000	......	20	
-23ab	A. Williams..........	......	Dr	80	6	P	R	O	C, W	S	Tc	.5	3, 698.00	45.65	Dec. 14, 1949	....	......	......	
-23cb1	......do................	......	Dr	23	18	P	S, G	A	T, E	I	Ls	......	3, 668.8	15	....	R600	10	......	EoBf.
-23cb2	......do................	......	Dr	100	18	P	S, G, C	A, B	T, E	I	Tc	1.0	3, 667.24	13.85	Jan. 15, 1948	R1,400	30	......	Bf-30, Sca.
-23dd	......do................	......	Dr	102	18	P	S, G, C	A, B	T, E	I	Hpb	1.0	3, 668.04	15.70	......do..........	R600	15	......	
-25ca	Robert Newman......	......	Dr	28	24	P	S, G	A	T, E	I	Tc	0	3, 645.43	10.31	......do..........	R800	......	......	
-26ac1	George Peterson.....	1947	Dr	102	18	P	S, G, C	A, B	T, E	I	Hpb	1.0	3, 659.29	9.44	......do..........	R1,000	10	......	
-26ac2	......do................	1948	Dr	90	24	P	S, G, C	A, B	T, E	I	Tc	0	3, 657.04	6.70	Mar. 14, 1950	R1,462	30	......	

Keith County, Nebr.

B12-40-6cb	....	......	Dr	98.5	6	P	R	O	C, W	D, S	Tpp	0	3, 423.25	91.50	June 24, 1949	....	......	......	
-17aa	F. J. Struckman......	1922	Dr	140	4	P	S, G	O	C, W	S	Ls	......	....	100+	....	....	......	......	Sca.
B12-41-2bc	Walter Armstrong....	1947	Dr	151	18	P	S, G	A	T, T	I	Hpb	0	3, 389.39	51.12	Nov. 10, 1948	R1,000	22	......	L.
-2bd	J. E. Allison.........	1948	Dr	149	18	P	S, G	A	T, T	I	Hpb	0	3, 390.76	53.22	......do..........	R1,000	......	......	L.
-3bd	Oscar Peterson.......	1947	Dr	149	18	P	S, G	A	T, T	I	Hpb	0	3, 391.10	46.50	Nov. 9, 1948	R1,300	24	......	EoBf.
-3db	Rowan Hoover.......	1947	Dr	158	18	P	S, G	A	T, T	I	Hpb	0	3, 390.14	47.55	......do..........	R1,500	25	......	
-4ac	Otto Aufrecht........	1947	Dr	149	18	P	S, G	A	T, T	I	Hpb	1.2	3, 392.20	45.62	Nov. 10, 1948	R1,200	8	......	EoBf.
-4cb	Mr. McClennan......	1942	Dr	150	24	P	S, G	A	T, T	I	Tc	1.0	3, 394.02	46.50	June 23, 1949	R700	......	......	
-4da	....	......	Dr	......	6	P	S, G	......	C, W	D, S	Tc	.8	3, 406.47	63.50	June 24, 1949	....	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
										Keith County, Nebr.—Continued									
B12-41-6dc1	T. Reimers........	......	Dr	85	18	P	S, G	A	T, E	I	Hpb	1.0	3,396.14	34.50	Nov. 9, 1948	R475	......	......	EoBf.
-6dc2	I. Gerhke..........	1948	Dr	110	......	P	S, G	A	T, T	I	Hpb	0	3,395.41	34.48	......do..........	R1,200	......	......	Do.
-7ba	M. Kenfield........	1945	Dr	108	18	P	S, G	A	T, E	I	Hpb	.5	3,397.79	33.63	Oct. 28, 1948	M735	8	80	Sca, EoBf.
-7bb	A. C. Eiker........	1947	Dr	100	18	P	S, G	A	T, E	I	Hpb	.5	3,397.76	32.29	......do..........	R1,000	14	100	EoBf.
-9bb	....	......	Dr	......	......	P	S, G	A	C, W	D	Tc	.7	3,438.12	87.20	June 23, 1949	......	......	......	
-10aa	....	......	Dr	......	4	P	R	O	C, W	S	Tc	.6	3,455.03	117.60	June 24, 1949	......	......	......	
B13-35-5ca	Town of Paxton.....	1925	Dr	109	12	P	S, G	A	T, E	P	Ls	......	......	45	......	R350	......	......	Sca, EoBf.
-6cc	....	......	Dr	......	......	P	S, G	A	V, T	I	Ls	......	......	16+	......	......	......	......	
-6dd1	Central Nebr. Public Power & Irrigation District.	1939	Dr	14.8	2	P	S, G	A	N	O	Tc	1.0	......	9.90	July 9, 1948	......	......	......	Cow.
-6dd2	......do..............	......	Dr	......	6	P	S, G	A	N	O	Fs	0	3,064.88	10.34	July 20, 1949	......	......	......	
-7bb	William Stierlem...	......	Dr	72	18	P	S, G	A	N	N	Tc	0	3,068.99	4.90	July 7, 1949	R950	25	......	Sca.
-8bd	C. Meyers...........	1937	J	12	$1\frac{1}{4}$	P	S, G	A	C, W	S	Ls	......	......	4	......	......	......	......	Do.
B13-36-1dc	....	......	Dr	......	6	P	S, G	A	C, W	D, S	Tc	1.0	3,114.45	55+	July 7, 1949	......	......	......	
-3cb	Central Nebr. Public Power & Irrigation District.	1939	......	14.7	2	P	S, G	A	N	O	Tc	.9	3,110.11	10.91	July 9, 1948	......	......	......	Cow.
-5db	Mr. Schultz.........	......	Dr	28	......	P	S, G	A	C, W	S, O	Tc	1.0	3,123.85	23.10	Nov. 6, 1947	......	......	......	

-6bc	Central Nebr. Public Power & Irrigation District.	1939	Dr	10.8	5	P	S, G	A	N	O	Tc	.4	3, 117.77	4.31	July 9, 1948	....	......	......	Cow.
-6db	....	......	Dr	......	18	P	S, G	A	C, W	S	Tpp	1.0	3, 118.58	6.10	July 7, 1949	....	......	......	
-8cc	U. S. Geol. Survey.	1945	Dr	11.0	15	P	S, G	A	N	O	Tc	1.0	3, 112.83	4.78	Feb. 7, 1946	....	......	......	Ari.
-9ad	......do.............	1945	Dr	11	15	P	S, G	A	N	O	Tc	1.0	3, 094.68	1.76	......do..........	....	......	......	Do.
-16bb	....	......	Dr	......	6	P	S, G	A	C, W	S	Tc	1.5	3, 111.77	11.10	July 21, 1949	....	......	......	Sca.
-16cc	Mr. Sales..........	......	Dr	......	6	P	......	......	......	S	Tpp	1.0	3, 149.68	36.50	......do..........	....	......	......	
-18ad	Frank Sedlack......	......	Dr	......	6	P	S, G	A, O	C, W	D	Tpp	1.8	3, 145.16	34.80	......do..........	....	......	......	
-20ad	J. C. Graham......	......	Dr	......	6	P	S, G	O	C, W	O	Hc	2.6	3, 200.29	98.90	Nov. 6, 1947	....	......	......	Sca.
B13-37-1bc	Mr. Paddock.......	......	Dr	......	6	P	S, G	A	C, W	D	Tpp	1.5	3, 159.29	40.45	July 21, 1949	....	......	......	
-3ab	....	......	Dr	......	6	P	S, G	A	C, W	S, O	Tc	1.4	3, 146.47	16.83	Oct. 2, 1947	....	......	......	Sca.
-4bc	Mr. Thalken.......	1946	Dr	72	18	P	S, G	A	T, T	I	Tc	1.2	3, 150.75	7.25	July 21, 1949	R1,100	......	......	
-4bd	......do.............	1944	Dr	71	18	P	S, G	A	T, G	I	Tpp	1.0	3, 152.10	10.15	......do..........	R1,000	......	......	
-5ac	Jack Armstrong.....	1940	Dr	50	18	P	S, G	A	T, T	I	Tc	0	3, 157.34	11.05	July 20, 1949	R1,000	......	......	
-5ad	Central Nebr. Public Power & Irrigation District.	1940	Dr	14.7	5	P	S, G	A	N	O	Tc	.8	3, 158.28	12.65	July 9, 1948	....	......	......	Cow.
-7bd	E. Cockerill........	1948	Dr	142	.....	P	S, G	A	T, T	I	Hpb	0	3, 185.17	25.20	Dec. 2, 1948	R1,100	......	......	
-9bc	Ted Apolius.........	......	Dr	......	.....	P	S, G	A	T, G	I	......	......	....	......	....	....	......	......	
-10ab	Robert Geisert......	1947	Dr	90	18	P	S, G	A	T, D	I	Hpb	0	3, 145.77	12.08	Oct. 25, 1949	R1,400	14	40	
-10cd	Sidney Franklin.....	1948	Dr	90	18	P	S, G	A	T, D	I	Hpb	2.3	3, 160.58	22.63	July 5, 1949	R1,100	......	......	Sca.
-11db	C. Ruhel...........	1938	Dr	60	18	P	S, G	A	T, G	I	Tc	1.0	3, 135.06	7.35	July 20, 1949	R1,500	......	......	
-15ab	....	......	Dr	......	6	P	S, G	A	C, W	D	Tc	.8	3, 170.15	34.02	July 5, 1949	....	......	......	
-16ab	Samuel Hilliard....	1930	Dr	......	6	P	S, G	A	N	O	Tc	.7	3, 202.89	59.66	Oct. 2, 1947	....	......	......	
-18ab	Edward Sibal........	......	Dr	68	6	P	S, G	A	C, W	D, S	Tc	1.5	3, 211.79	50.10	June 22, 1949	....	......	......	
-29ac	R. Nelson..........	1949	Dr	262	18	P	S, G	O	T, D	I	Ls	......	....	220	....	R950	20	......	Ssu.
B13-38-1ba	....	......	Dr	60.0	4	P	S, G	A	C, W	D, S	Tc	1.3	3, 214.98	50.10	July 7, 1949	....	......	......	
-2aa	F. H. Lute..........	......	Dr	24.5	6	P	S, G	A	C, W	S	Ls	......	....	18	....	....	......	......	
-3bb	Central Nebr. Public Power & Irrigation District.	1939	Dr	......	6	P	S, G	A	N	O	Tc	2.1	3, 199.68	16.25	Aug. 5, 1948	....	......	......	Cow.
-3cd	E. Geisert..........	......	Dr	53	18	P	S, G	A	T, T	I	Hpb	1.0	3, 190.55	5.91	July 21, 1949	R900	......	......	
-4dd	J. Sorensen.........	1949	Du	12	12	P	S, G	A	J, E	D	Ls	......	....	6	....	....	......	......	Sca.
-5ba	....	......	Dr	......	4	P	S, G	A	C, W	D	Tc	2.5	3, 268.09	67.20	July 7, 1949	....	......	......	
-6ca1	Central Nebr. Public Power & Irrigation District.	1939	Dr	18.0	5	P	S, G	A	N	O	Tc	2.3	3, 220.14	16.28	July 9, 1948	....	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
	Keith County, Nebr.—Continued																		
B13-38-6ca2	City of Ogallala....	1941	Dr	187	24	P	S, G	A,O	T, E	P	Hpb	3.0	....	15	....	R800	23		Sca, EoBf.
-6da	......do..............	1939	Dr	187	24	P	S, G	A,O	T, E	P	Hpb	4.0	....	13.65	Oct. 26, 1949	R800	30	......	EoBf.
-7cc	Charles Mueller....	1945	Dr	120	18	P	S, G	A	T, E	I	Hpb	1.0	3,232.80	20.62	Nov. 29, 1948	R1,180	20	100	Do.
-7cd	......do..............	1944	Dr	166	18	P	S, G	A	T, E	I	Hpb	.5	3,245.10	37.55	......do..........	R800	30	100	Do.
-7dd	......do..............	1946	Dr	236	18	P	S, G	A	T, E	I	Hpb	1.0	3,246.74	40.68	......do..........	R1,180	20	100	Do.
-8cc	Hans Eichner.......	1948	Dr	237	18	P	S, G	A	T, E	I	Hpb	.3	3,242.35	38.72	......do..........	R1,000	......	80	
-9bc	Joseph Paloucek....	1931	Dr	68	18	P	S, G	A	T, E	I, O	Tc	1.5	3,219.17	24.69	Nov. 30, 1948	....	......	28	
-9da	....	......	Dr	....	.....	P	S, G	A	C, W	S	Tc	1.5	3,202.92	11.37	July 15, 1949	....	......	......	
-10bd	Countryman Dale..	......	Dr	121	18	P	S, G	A	T, G	I	Hpb	.7	3,198.51	13.81	July 5, 1949	....	......	......	Bf-119.
-14aa	School district......	......	Dr	55.0	6	P	S, G	A	C, H	P	Tpp	.3	3,222.75	52.50	June 22, 1949	....	......	......	
-15bb	Harry Goold........	......	Dr	40	6	P	S, G	A	C, W	D	Bpb	1.0	3,240.26	26.20	......do..........	....	......	......	
-18ac	Charles Mueller....	1948	Dr	250	6	P	S, G	A	N	N	Tc	1.5	3,263.84	56.20	Nov. 30, 1948	....	......	......	EoBf.
-18bc	John Koenig.........	1936	Dr	196	24	P	S, G	A	T, D	I	Bpb	.5	3,263.39	51.07	......do..........	R900	22	90	
-31ab	H. Frerichs..........	1911	Dr	225	4	P	S, G	O	C, W	D,S	Ls	......	....	200	....	....	......	......	Sca.
B13-39-1bc	City of Ogallala....	1939	Dr	140	18	P	S, G	A	T, E	I	Hpb	2.0	3,254.80	37.92	Sept. 15, 1949	....	......	12½	Ssu,Sca.
-1ca	Mr. Archer..........	1948	Dr	108	18	P	S, G	A	T, T	I	Hpb	0	3,228.48	11.98	July 6, 1949	....	......	20	
-1cb	H. C. Meyers.......	1945	Dr	214	18	P	S, G	A	T, E	I	Hpb	0	3,245.96	....	....	R1,100	7	80	
-2cb	D. P. Brown........	1946	Dr	....	18	P	S, G	A	T, E	I	Hpb	1.5	3,270.54	45.25	July 6, 1949	....	......	......	
-3db	Antonia Washa......	......	Dr	153	18	P	S, G	A	T, D	I	Tc	1.5	3,279.94	52.25	......do..........	R900	......	......	
-4cc	School district......	......	Dr	....	6	P	S, G	A	C, W	P	Tc	.7	3,290.00	47.50	......do..........	....	......	......	
-7bd	H. Frerichs.........	1944	Dr	195	18	P	S, G	A	T, E	I	Hpb	.5	3,323.84	66.20	......do..........	R900	......	......	EoBf.

-7db1	Henry Sass..........	1949	Dr	......	18	P	S, G	A	N	N	Tc	1.0	3, 310.07	52.80	......do..........	....	......	......	
-7db2	......do..............	1949	Dr	......	18	P	S, G	A	T, T	I	Hpb	.7	3, 302.05	45.20	......do..........	....	......	......	
-8ca	Clyde Soddarth......	1947	Dr	......	18	P	S, G	A	T, G	I	Hpb	0	3, 280.83	37.91	......do..........	....	......	......	
-8db	Charles D. Pike.....	1938	Dr	138	18	P	S, G	A	T, D	I	......	......	....	......	....	R1,000	13	......	EoBf.
-9ba	G. A. McVay.......	1944	Dr	122	18	P	S, G	A	T, E	I	Hpb	.6	3, 284.67	50.10	July 6, 1949	....	27	......	
-9ca	Searles brothers.....	1948	Dr	139	18	P	S, G	A	T, T	I	Hpb	.8	3, 257.96	15.40	......do..........	R1,300	20	......	
-9cb	A. Searle............	......	Dr	......	24	P	S, G	A	T, E	I	Tc	0	3, 249.36	13.38	......do..........	....	......	......	
-9cc	......do..............	......	Dr	39.2	24	P	S, G	A	T, E	I, O	Tc	-1.0	3, 248.80	5.32	Oct. 2, 1947	....	......	......	
-10aa	Antonio Washo......	1942	Dr	......	18	P	S, G	A	T, G	I	Tc	1.0	3, 259.85	31.30	July 6, 1949	....	20	......	
-10ad	Searles brothers.....	......	Dr	110	18	P	S, G	A	T, E	I	Hpb	1.0	3, 250.96	21.92	......do..........	R1,020	50	......	
-11db	Dan Spangler........	1946	Dr	60	18	P	S, G	A	T, T	I	Hpb	2.0	....	7.06	Nov. 30, 1948	R800	......	20	
-11dc	......do..............	1938	Dr	42	18	P	S, G	A	T, G	I	Hpb	0	3, 239.81	15.37	......do..........	R450	......	20	
-11dd	......do..............	1938	Dr	42	24	P	S, G	A	T, E	I	Hpb	0	3, 239.45	17.05	......do..........	R450	12	15	
-12cc	Harry Tressler.......	1929	Dr	45	24	P	S, G	A	T, T	I	Tc	.5	3, 238.28	17.22	Nov. 29, 1948	R500	20	30	
-13ac	Rene J. Martin......	1937	Dr	216	24	P	S, G	A	T, D	I	Bpb	.5	3, 268.41	52.02	Nov. 30, 1948	R1,390	24	75	Sca, EoBf.
-13ad	......do..............	1944	Dr	208	18	P	S, G	A	T, D	I	Hpb	0	3, 270.78	54.05	......do..........	R900	27	60	EoBf.
-13cb	John J. Vasa..........	1942	Dr	289	18	P	S, G	A	T, T	I	Hpb	.5	3, 275.80	54.11	......do..........	R1,600	22	120	
-14ac	C. C. Goodrich.....	1945	Dr	162	......	P	S, G	A	T, G	I	Hpb	0	3, 266.86	40.59	June 23, 1949	....	......	......	
-14bd	......do..............	......	Dr	......	18	P	S, G	A	T, T	I	Ls	......	3, 264.3	40	....	....	......	......	
-15cc	A. W. Peterson.....	1943	Dr	......	18	P	S, G	A	T, E	I	Hpb	1.0	3, 262.91	17.95	June 23, 1949	....	......	......	
-15cd	......do..............	1943	Dr	......	......	P	S, G	A	T, E	I, O	Hpb	1.0	3, 264.32	24.72	Nov. 6, 1947	R600	16	......	
-15dc	John Washo..........	1940	Dr	129	18	P	S, G	A	T, E	I	Hpb	.7	3, 263.20	23.75	June 23, 1949	R900	......	......	
-15dd	......do..............	1940	Dr	131	18	P	S, G	A	T, E	I	Tc	1.0	3, 260.42	26.30	......do..........	R900	......	......	
-16ba	Searle brothers......	......	Dr	......	18	P	S, G	A	T, E	I	Tc	0	3, 249.27	3.88	July 6, 1949	....	......	......	
-17dd	A. Jimenez..........	......	Dr	......	18	P	S, G	A	T, D	I	Hpb	1.5	3, 262.15	11.63	Dec. 2, 1948	....	......	......	
-18bb	Ray Hughes..........	......	Dr	122	18	P	S, G	A	T, G	I	Hpb	0	3, 293.55	31.20	July 6, 1949	....	......	83	
-19cd	George McGinley...	......	Dr	53.7	4	P	S, G	A	N	O	Tc	3.7	3, 314.61	46.86	Oct. 2, 1947	....	......	......	
-19dc	......do..............	1948	Dr	246	18	P	S, G	A	T, D	I	Ls	......	3, 321.7	59	....	R1,300	19	......	
-19dd1	......do..............	......	Dr	......	18	P	S, G	A	T, D	I	Hpb	1.0	3, 325.72	60.45	Dec. 1, 1948	....	......	......	
-19dd2	......do..............	1948	Dr	211	18	P	S, G	A	T, D	I	Hpb	1.5	3, 315.83	53.15	......do..........	R1,360	12	......	
-20aa	A. Jimenez..........	......	Dr	......	18	P	S, G	A	T, D	I	Hpb	1.0	3, 288.27	34.50	Dec. 2, 1948	....	......	......	
-29ab	Mr. Eberhart.........	......	Dr	......	6	P	S, G	A	C, W	D, S	Tpp	1.0	3, 340.32	83.10	June 23, 1949	....	......	......	
-30bc	Hubert Beale........	1944	Dr	196	18	P	S, G	A	T, G	I	Hpb	0	3, 334.96	65.33	Dec. 1, 1948	R1,400	......	......	EoBf.
-30da	G. A. Hull...........	......	Dr	100	6	P	S, G	A	C, W	D	Ls	......	3, 352.1	83	....	....	......	......	
-33cc	Mr. Shelborne.......	1947	Dr	400	18	P	S, G	O	T, D	I	Ls	......	....	200	....	R800	20	105	Ssu.
-34dd	George Peters Estate	......	Dr	199.3	$3\frac{1}{2}$	P	S, G	O	C, W	S, O	Hc	1.0	....	168.29	Oct. 2, 1947	....	......	......	

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Keith County, Nebr.—Continued										
B13-40-12bc	H. Dressler..........	1948	Dr	130	18	P	S, G	A	T, T	I	Hpb	0.5	3,328.45	61.50	June 30, 1949	R450	40	......	EoBf.
-12bd	......do................	1944	Dr	118	18	P	S, G	A	T, D	I	Hpb	1.0	3,320.44	55.40	......do..........	R900	40	......	Do.
-13ad	A. Smith............	1944	Dr	80	18	P	S, G	A	T, G	I	Ls	......	3,284.71	21	....	R1,000	7	......	
-13bb	Ira Cooney...........	1938	Dr	54	48	P	S, G	A	T, T	I	Ls	......	3,290.96	22	....	R1,000	10	200	
-14ba	Roy Frates...........	1938	Dr	127	72-18	P	S, G	A	T, G	I	Tpp	.8	3,315.92	39.10	June 30, 1949	R900	45	......	
-14bb	......do................	1948	Dr	124	18	P	S, G	A	T, T	I	Hpb	.5	3,330.00	52.70	......do..........	R700	40	......	Sca.
-14db	C. C. Goodrich.....	......	Dr	......	18	P	S, G	A	T, T	I	......	......	......	......	......	......	......	......	
-14dd	Mr. Lustenburger....	......	Dr	......	18	P	S, G	A	T, T	I	Ls	......	3,284.3	......	......	......	......	......	
-15ad	Joseph McCarty......	1945	Dr	80	18	P	S, G	A	T, G	I	Hpb	0	3,309.79	28.42	June 30, 1949	R750	24	20	
-15ba	Mrs. M. E. Craig...	......	Dr	120	......	P	S, G	A	T, G	I	Hpb	0	3,551.59	66.12	......do..........	......	......	......	
-15cb	Van Velsen...........	......	Dr	145	......	P	S, G	A	T, T	I	Hpb	2.0	3,320.55	32.67	June 29, 1949	R900	......	......	
-15da	O. Beale..............	......	Dr	......	......	P	S, G	A	T, T	I	......	......	......	......	......	......	......	......	
-15db	Town of Brule........	1950	Dr	125	18	P	S, G	A	T, E	P	Tvp	1.5	......	12.83	July 14, 1951	R220	8	......	
-16ba	John Hughes.........	1941	Dr	154	18	P	S, G	A	T, G	I	Hpb	0	3,358.60	65.51	June 29, 1949	......	......	......	EoBf.
-16ca1	Richard Harms.......	1944	Dr	111	18	P	S, G	A	T, E	I	Hpb	0	3,330.22	40.11	Oct. 27, 1949	R1,000	12	......	Do.
-16ca2	......do................	1938	Dr	100	48-18	P	S, G	A	T, E	I	Hpb	.5	3,323.64	32.18	June 29, 1949	R1,000	......	......	
-19aa	....	......	Dr	......	6	P	S, G	A	C, W	I	Tc	1.2	3,322.74	18.90	June 30, 1949	......	......	......	
-21bb	Norman Frates.......	......	Dr	116	18	P	S, G	A	T, G	I	Tc	1.0	3,319.78	23.30	June 29, 1949	......	......	......	
-21cc	Clyde Ryan..........	1947	Dr	150	18	P	S, G	A	T, G	I	Hpb	1.0	3,308.36	12.76	Nov. 30, 1948	R1,500	......	......	
-22aa	Charles Anderson....	1946	Dr	61	18	P	S, G	A	T, E	I	Hpb	0	3,286.93	5.15	July 7, 1949	R810	19	22	Sca.

-22bb1	Central Nebr. Public Power & Irrigation District.	1939	Dr	12.0	2	P	S, G	A	N	O	Tc	.9	3, 293.04	8.18	July 9, 1948	......	......	......	Cow.
-22bb2	Fred Williams	......	Dr	......	18	P	S, G	A	T, T	I	Hpb	0	3, 293.72	5.15	June 30, 1949	......	......	......	
-22cc	Orville Beale	1947	Dr	132	18	P	S, G	A	T, G	I	Hpb	1.0	3, 298.47	8.35	Nov. 30, 1948	R1,200	......	......	Bf-201.
-22cd	......do	......	Dr	13.0	6	P	S, G	A	C	S, O	Tpp	.3	3, 295.83	7.36	Oct. 2, 1947	......	......	......	
-24da	George McGinley	......	Dr	......	18	P	S, G	A	T, E	I	Ls	......	......	8	......	......	......	......	
-24dc	......do	......	Dr	......	18	P	S, G	A	T, E	I	Hpb	2.5	3, 306.12	33.87	Dec. 1, 1948	......	......	......	
-24dd	......do	......	Dr	......	18	P	S, G	A	T, E	I	Hpb	4.0	3, 308.39	37.25	......do	......	......	......	
-25ac	A. Jimenez	......	Dr	......	18	P	S, G	A	T, D	I	Tc	1.5	3, 326.07	50.06	......do	......	......	......	
-25ad	......do	......	Dr	......	18	P	S, G	A	T, G	I	Hpb	2.5	3, 325.07	52.60	......do	......	......	......	
-25bd	George McGinley	......	Dr	......	18	P	S, G	A	T, D	I	......	......	......	......	......	......	......	......	
-25cc	Calvin Schultz	......	Dr	......	24	P	S, G	A	T, T	I	Tc	1.5	3, 329.44	47.82	Dec. 1, 1948	......	......	......	
-26ac	A. W. Peterson	1940	Dr	87	24	P	S, G	A	T, E	I	Ls	......	......	28	......	R500	......	......	
-26ad	......do	......	Dr	95	36	P	S, G	A	T, E	I	Ls	......	......	30	......	R700	......	......	
-26bc	Bruce Stafford	1940	Dr	50	18	P	S, G	A	T, T	I	Hpb	2.0	3, 321.30	29.85	Dec. 1, 1948	R500	......	......	
-26cd	H. R. Halligan	1945	Dr	205	18	P	S, G	A	T, D	I	Hpb	1.0	3, 336.74	48.65	......do	R1,000	15	......	EoBf.
-26dc	Leo Jehoreck	1946	Dr	218	18	P	S, G	A	T, T	I	Hpb	0	3, 340.89	58.35	......do	R1,400	......	......	Do.
-27ad	Mrs. Rewerts	1938	Dr	......	18	P	S, G	A	T, T	I	Hpb	.7	3, 307.56	18.09	Nov. 30, 1948	......	......	......	
-27bb	George McGinley	......	Dr	......	18	P	S, G	A	T, E	I	Hpb	2.0	3, 301.88	9.62	......do	......	......	......	Sca.
-27cc	......do	......	Dr	......	18	P	S, G	A	T, D	I	......	......	......	......	......	......	......	......	
-27cd	......do	......	Dr	......	......	P	S, G	A	T	I	Ls	......	3, 321.5	......	......	......	......	......	
-27dc	E. Reimers	1946	Dr	222	18	P	S, G	A	T, G	I	Hpb	1.0	3, 325.75	33.70	Nov. 30, 1948	R1, 230	16	......	EoBf.
-28ad	Claude Rhoades	1945	Dr	159	18	P	S, G	A	T, E	I	Ls	......	......	8	......	R1,400	......	......	Do.
-28ca	Mabel Douglas	1946	Dr	190	......	P	S, G	A	T, T	I	Ls	......	......	13	......	R1,700	......	160	
-28cd	C. B. Douglas	1944	Dr	148	18	P	S, G	A	T, E	I	Hpb	.5	3, 314.70	15.79	Nov. 30, 1948	......	......	80	Bf-180.
-28dc	Lloyd Anderson	1945	Dr	171	18	P	S, G	A	T, E	I	Ls	......	3, 313.3	16	......	R1,280	......	80	
-29ac	Bert Kuski	1940	Dr	......	24	P	S, G	A	T, T	I	Hpb	1.5	3, 310.26	9.93	Nov. 10, 1948	R1,000	......	......	
-29ba	Paul Kuski	1947	Dr	150	18	P	S, G	A	T, T	I	Hpb	0	3, 315.73	9.76	......do	R1,400	......	......	
-29bc	B. Kuski	1940	Dr	......	36	P	S, G	A	T, T	I	Hwc	.8	3, 318.35	13.95	......do	R1,500	......	......	
-29cb	J. A. Brown	......	Dr	......	24	P	S, G	A	N	N	Tc	1.1	3, 315.02	8.10	July 12, 1949	......	......	......	
-29cc1	......do	1932	DD	45	......	P	S, G	A	H, T	I	Ls	......	......	......	......	R700	......	......	Bw-2, EoBf.
-29cc2	......do	1944	Dr	155	18	P	S, G	A	T, E	I	Hpb	1.0	3, 320.61	16.50	Nov. 29, 1948	R1,300	......	......	EoBf.
-29dd	......do	1937	Dr	44	......	P	S, G	A	T, E	I	Tc	0	3, 320.17	10.45	Nov. 30, 1948	R800	......	......	Do.
-31ad	W. A. Stafford	1947	Dr	118	......	P	S, G	A	T, T	I	Hpb	1.0	3, 343.97	29.02	Nov. 10, 1948	R1,100	12	......	
-31bc	Hardessen Hatch	1928	Dr	65	30	P	S, G	A	T, E	I	Ls	......	......	14	......	R800	......	......	
-31cd	Harold Ballantine	1942	Dr	151	24	P	S, G	A	T, E	I	Ls	......	3, 364.4	43	......	R1,263	......	......	EoBf.

Records of wells and springs in the lower South Platte River valley, Colorado and Nebraska—Continued

Well no.	Owner or user	Year drilled	Type of well	Depth of well (feet)	Diameter of well (inches)	Type of casing	Principal water-bearing bed: Character of material	Principal water-bearing bed: Geologic source	Method of lift	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 level below measuring point (feet)	Date of measurement	Yield (gallons per minute)	Drawdown (feet)	Acres irrigated	Remarks
									Keith County, Nebr.—Continued										
B13-40-31dc	P. Brown	1938	Dr	153	18	P	S,G	A	T,G	I	Tc	1.0	3,366.62	44.61	Oct. 26, 1949	R800	45	......	EoBf.
-32bc	Victor Halligan	......	Dr	150	.....	P	S,G	A	T,D	I	Hpb	1.0	3,344.92	33.81	Nov. 29, 1948	R1,700	......	......	
-32bd	......do	......	Dr	....	18	P	S,G	A	T,G	I	Tc	1.0	3,344.88	35.72	......do	R1,000	......	......	
-32cc	W. I. Forney	1946	Dr	165	18	P	S,G	A	T,E	I	Ls	......	3,370.6	....	....	....	......	......	EoBf.
-32cd	......do	1945	Dr	165	18	P	S,G	A	T,G	I	Hpb	1.5	3,370.48	58.26	Nov. 29, 1948	....	......	......	Do.
-32dc	F. P. Soper	1937	Dr	195	18	P	S,G	A	T,E	I	Ls	......	3,375.7	65	....	R800	......	......	Sca.
-33ac	O. Beale	1938	Dr	125	.....	P	S,G	A	T,T	I	....	......	....	....	....	....	......	......	
-33cc	George Ballantine	1947	Dr	176	18	P	S,G	A	T,T	I	Hpb	.5	3,371.24	63.65	Nov. 29, 1948	R1,000	......	......	EoBf
-33dd1	Byron Ballantine	1940	Dr	232	.....	P	S,G	A	T,G	I	....	......	....	....	....	R1,200	......	......	Do.
-33dd2	......do	1938	Dr	110	.....	P	S,G	A	T,G	I	....	......	....	....	....	....	......	......	U-3.
-34db	E. E. Frates	......	Dr	123	18	P	S,G	A	T,G	I	Hpb	0	3,366.11	70.70	Nov. 30, 1948	....	......	......	Bf-220.
-35bc	O. Beale	1938	Dr	90	18	P	S,G	A	T,G	I	Tc	1.0	3,355.66	63.52	Dec. 1, 1948	....	......	......	
B13-41-13cc	....	......	Dr	....	.....	P	S,G	A,O	C,W	S	Tc	1.6	3,403.37	49.22	Nov. 5, 1947	....	......	......	Sca.
-22cc	......do	......	Dr	....	.....	P	S,G	A,O	C,W	S	Tc	1.3	3,344.07	37.81	June 29, 1949	....	......	......	
-24aa	School district	......	Dr	74.9	3	P	S,G	A	C,H	P,O	Tc	.6	3,372.19	59.90	Nov. 5, 1947	....	......	......	
-24cb	Earl Russey	......	Dr	124	6	P	S,G	A	C,W	D	Ls	......	3,350.7	42	....	....	......	......	
-32ab	Hubert Beale	1948	Dr	49	24	P	S,G	A	T,E	I	Tc	1.0	3,356.55	7.17	Oct. 28, 1948	R650	......	......	EoBf.
-32ac	......do	1932	DD	35	60	C	S,G	A	T,E	I	Bpb	1.0	3,357.00	5.49	......do	R700	......	......	
-32ad	......do	......	Dr	....	6	P	S,G	A	C,H	D	Tc	.7	3,354.18	5.65	June 23, 1949	....	......	......	
-32bc1	Carl Kjeldgaard	1948	Dr	27	24	P	S,G	A	T,T	I	Tc	.5	3,357.63	6.09	Oct. 28, 1948	R1,000	16	50	Bf-44.
-32bc2	......do	1936	DD	20	48-18	P	S,G	A	H,E	I	Tdp	1.5	3,359.67	6.42	......do	....	......	25	

-32bc3	......do......	1927	Dr	20	18	C	S,G	A	T,E	I	Tc	.5	3,359.74	5.28	......do......	R700	......	25	
-32cc	D. Dorn......	......	DD	40	24	P	S,G	A	H,E	I	Tpc	1.0	3,365.01	6.37	......do......	R250	......	......	U-3.
-32dc	Julius Zabel......	1926	DD	45	15	P	S,G	A	H,E	I	Tc	-2.5	3,359.88	3.31	......do......	R750	12	40	
-32dd	......do......	1928	DD	57	24	P	S,G	A	V,E	I	Tpc	0	3,361.79	5.98	......do......	R900	12	60	
-33cc1	Omar Beale......	1932	Dr	27	24	P	S,G	A	T,T	I	Ls	......	......	6	......	R800	......	......	
-33cc2	......do......	1948	Dr	67	18	P	S,G	A	T,E	I	Hpb	0	3,358.56	6.24	Nov. 9, 1948	R1,200	......	......	Bf-62.
-33dd	George Eiker......	1926	Dr	50	18	P	S,G	A	T,T	I	Hpb	0	3,362.05	12.38	......do......	R800	......	......	
-34bb	J. H. Sauers......	......	Dr	......	6	P	S,G	A	C,W	D,S	Tpp	1.0	3,347.80	7.60	June 23, 1949	......	......	......	
-34bc	......do......	......	Dr	24.5	24	P	S,G	A	T,T	I	Tc	0	3,351.11	8.30	Nov. 9, 1948	......	......	......	
-34cd	E. W. Bostrom......	1935	Dr	43.6	24	P	S,G	A	T,E	I,O	Fs	.5	3,367.37	21.23	Oct. 2, 1947	R1,050	......	......	Sca.
-34dc	C. Kjeldgaard......	1938	Dr	......	24	P	S,G	A	T,T	I	Fs	1.0	3,354.79	10.85	Nov. 9, 1948	......	......	......	
-35dc	Oscar Peterson......	1936	Dr	42	36	P	S,G	A	T,T	I	Tc	.6	3,359.24	24.40	......do......	R550	......	......	
-35dd	......do......	1939	Dr	66	24	P	S,G	A	T,T	I	Ls	......	3,356.6	22	......	R800	......	......	
-36cb	E. Reimers......	1932	Dr	87	......	P	S,G	A	T,E	I	......	......	......	......	......	R870	......	......	
-36cd	......do......	1948	Dr	123	18	P	S,G	A	T,T	I	Hpb	1.0	3,362.42	32.25	Nov. 9, 1948	R1,200	11	......	EoBf.
-36dc	......do......	1948	Dr	128	......	P	S,G	A	T,T	I	Ls	......	3,366.2	39	......	R1,150	21	......	Do.
-36dd	......do......	1935	Dr	132	......	P	S,G	A	T,E	I	Hpb	1.0	3,358.20	32.19	Nov. 10, 1948	R1,230	......	......	Do.
B14-37-34ac	C. E. Thalken......	1908	Dr	183	$3\frac{1}{2}$	P	S,G	O	C,W	S	Ls	......	......	165	......	......	......	......	Sca.

APPENDIX D

Analyses of ground water in the lower South Platte

[Geologic source: A, Alluvium; B, Brule formation; D, dune sand; F, Fox Hills sandstone; per million un-

Well no.	Date of collection	Depth of well (feet)	Geologic source	pH	Specific conductance (micromhos/cm at 25°C)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
								Logan County,	
B6-53-30bc	Sept. 21, 1949	110	A	7.7	1,970	39	0.18	198	74
B6-54-13da	Nov. 21, 1949	70	A	8.3	1,720	25	.25	183	55
29bc	Sept. 20, 1949	280	A	7.7	1,390	40	7.9	118	36
B7-52-5bb	Sept. 16, 1949	435	P	7.8	1,220	20	.40	33	11
9dc	Sept. 29, 1949	35	D	7.5	556	48	1.2	70	17
B7-53-18bd	Aug. 3, 1948	48	A	7.5	1,550	54	.20	176	44
27ca	Aug. 18, 1948	230	P	8.2	1,880	15	.30	6.0	5.2
B8-52-21ac2	Sept. 16, 1949	435	P	8.0	2,900	15	.44	6.0	2.7
34ac	Nov. 17, 1949	114	A,-D	7.6	1,230	44	.10	151	24
B9-51-16ab1	Oct. 7, 1947	70	A	7.9	4,230	31	.02	223	90
16ab2	......do..........	220	P	8.6	2,620	18	.02	5.0	3.5
29ab	Sept. 21, 1949	310	P	8.0	2,890	15	2.1	16	4.0
B9-52-33dd	Sept. 20, 1949	48	A	7.6	1,680	46	.46	210	52
B10-48-4bc	Sept. 23, 1949	38.0	A	7.0	3,610	28	.52	260	90
B10-49-2cb	.....do..........	32	A	7.3	2,150	52	1.9	206	48
8cc	Sept. 22, 1949	52	A	7.3	1,580	54	.40	210	28
11cb	Nov. 8, 1949	55	A	7.5	1,910	39	.09	214	41
35bb	Sept. 22, 1949	....	D, A	7.9	319	41	.04	50	4.8
B10-50-24cd1	.....do..........	385	P	8.0	1,900	10	.33	8.0	1.4
24cd2	.....do..........	30	A	7.4	2,890	19	.04	190	51
34cd	Sept. 21, 1949	31	D, A	7.7	271	53	.06	38	3.3
B10-51-24aa	Sept. 20, 1949	28.0	A	7.3	1,830	48	.79	200	40
								Morgan County,	
B1-55-5cd	Oct. 20, 1947	43	A	7.7	1,740	36	0.05	154	64
31da	Nov. 30, 1947	62	A	7.8	1,730	27	.02	226	83
B1-56-2dd	Oct. 30, 1947	40.8	A	8.0	2,080	27	.02	282	92
5dc	Oct. 20, 1947	39.0	D, A	7.3	2,910	45	.20	294	156
12da	July 28, 1948	70	A	7.4	2,620	22	.05	394	102
B1-57-6da	Oct. 21, 1947	24.5	D, P	8.4	961	51	.02	89	36
B1-59-19bb	July 28, 1948	105	A	7.5	1,030	47	.02	145	24
B1-60-2dd	Oct. 16, 1947	86	A	7.6	912	24	.20	103	17
B2-57-6dc	Aug. 9, 1948	96	A	7.8	1,110	31	.32	109	39
20dc	Oct. 1, 1948	81	A	7.6	1,550	26	.10	174	73
-29dd1	Aug. 9, 1948	73	A	7.4	1,640	35	.24	152	53
B2-59-32cc2	Nov. 18, 1947	136	A	7.9	1,050	20	1.1	104	27
32cc3	.....do..........	136	A	7.7	1,090	23	1.1	112	33
B3-56-3da	Nov. 25, 1949	85	A	7.7	1,540	16	3.1	188	56
12bc	Nov. 5, 1947	....	A	7.4	1,230	17	.02	104	58
14cc	July 28, 1948	92	A	7.8	325	22	.05	41	7.5
22ab	Sept. 8, 1948	85	A, D	7.6	186	4.8	1.0	21	8.7
22da	Sept. 7, 1948	83	A, D	7.9	180	22	.14	23	7.0
26bb	Nov. 30, 1950	112	A, D	....	216	....	.01	....	....
B3-57-6bd	Nov. 25, 1949	175	A	7.6	1,480	28	.10	213	51
30bb	Aug. 9, 1948	121	A	7.5	1,750	35	.14	220	53
B3-58-1dd	Oct. 15, 1947	120	A	7.7	1,930	30	.20	297	56

See footnotes at end of table.

River valley, between Hardin, Colo., and Paxton, Nebr.

L, Laramie formation; O, Ogallala formation; P, Pierre shale. Analytical results in parts less otherwise stated]

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Percent sodium
Colo.											
164	23	532	630	48	2.6	4.9	....	1,450	799	363	30
125	12	[a]310	646	50	.7	6.1	....	1,260	683	429	28
120	12	286	298	128	1.0	11	....	928	443	208	36
239	3.4	444	103	127	1.0	.7	....	778	128	0	80
16	12	244	39	18	.4	34	....	382	245	45	12
128	6.8	326	556	39	.5	12	....	1,180	620	353	31
432	9.6	[b]810	2.4	235	2.8	.0	....	1,110	36	0	95
676	2.4	798	5.0	598	1.2	.7	....	1,700	26	0	98
91	4.0	230	446	31	.3	3.0	....	934	475	286	29
804	5.6	408	2,070	153	1.0	1.8	1.6	3,580	926	591	65
590	6.4	[c]785	22	478	1.0	1.9	.60	1,500	27	0	97
669	8.0	710	15	658	.8	.5	....	1,740	57	0	96
134	18	334	680	54	.6	4.6	....	1,360	738	464	28
506	14	302	1,640	174	.8	.9	....	2,860	1,020	772	51
212	23	334	763	113	.8	18	....	1,600	712	438	38
126	17	312	565	63	.4	14	.40	1,230	639	383	29
180	10	300	712	87	.6	4.9	....	1,440	703	457	35
10	5.1	172	8.0	5.0	.4	20	.30	250	145	4	13
428	5.6	564	.0	362	.4	.6	.40	1,090	26	0	97
510	18	464	1,190	157	1.2	1.9	.40	2,370	684	304	61
11	7.2	146	6.0	2.0	.4	9.5	.30	206	109	0	17
164	20	272	710	57	1.2	4.2	....	1,380	664	441	34
Colo.											
187	2.4	412	584	57	0.5	24	0.41	1,320	647	310	38
100	.4	262	843	13	.4	20	.27	1,440	905	691	19
126	5.2	276	790	14	.2	21	.33	1,500	1,080	854	20
282	2.0	322	1,490	78	2.0	69	.78	2,580	1,380	1,120	31
146	12	330	1,300	26	.4	64	.36	2,230	1,400	1,130	18
83	3.6	[d]432	135	24	.3	42	.01	690	370	16	33
51	4.4	244	344	6.8	.6	1.0	.07	770	460	260	19
75	.0	235	282	11	.9	.4	.12	655	327	134	33
74	3.6	280	328	20	1.0	13	....	796	432	202	27
151	14	200	796	25	.7	11	.32	1,380	734	570	30
158	7.2	210	692	21	.5	12	....	1,240	597	425	36
86	7.2	180	398	8.0	1.2	1.0	.12	774	370	222	33
84	7.2	222	409	5.0	1.2	1.4	.15	793	415	233	30
103	3.6	242	644	43	.4	.7	.20	1,180	700	502	24
92	4.8	432	329	10	.8	1.1	.30	829	498	144	28
16	4.0	120	58	5.5	.5	.7	.10	212	133	35	20
10	2.0	105	17	3.4	.6	.0	.08	122	88	2	19
8.7	1.6	96	20	2.0	.4	.5	.07	134	86	7	18
....	....	....	....	....	.5	.2	....	152	102	....	....
58	5.2	245	586	46	.5	9.6	....	1,120	741	540	14
112	9.2	316	676	43	.8	22	....	1,330	767	508	24
128	.4	304	863	56	.4	4.4	.26	1,590	971	722	22

Analyses of ground water in the lower South Platte River

Well no.	Date of collection	Depth of well (feet)	Geologic source	pH	Specific conductance (micromhos/cm at 25°C)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
									Morgan County,
B3-58-2bc1	Oct. 31, 1947	120	A	7.3	1,690	28	0.02	262	39
3ba	July 28, 1948	147	A	7.3	1,350	31	.14	174	28
21bc	Nov. 23, 1948	106	A	7.9	557	24	1.8	71	16
27da	Dec. 17, 1948	46.0	A	7.4	1,620	26	.60	186	60
B3-59-10bc	Oct. 20, 1948	156	A	7.4	1,430	37	.20	276	46
B3-60-11cc	Nov. 4, 1947	....	A	7.9	1,180	23	.02	178	26
32cb	Oct. 3, 1947	84	A	7.8	852	29	.02	69	24
B4-55-6cb2	Sept. 20, 1949	39.0	A	7.4	2,350	47	.80	296	59
22bb	Nov. 5, 1947	....	A	7.4	1,740	37	.05	220	67
B4-56-13ac	Sept. 20, 1949	35	A	7.3	2,260	28	.48	214	99
26cc	July 28, 1948	90	A	7.8	1,980	26	.05	210	74
30bc	Oct. 30, 1947	10	A	7.6	1,930	26	.20	175	70
33bb	Aug. 18, 1948	128	A	7.4	2,180	24	.02	202	83
B4-57-13da	Aug. 13, 1948	60	A	7.3	3,160	54	.02	433	99
19db	Sept. 28, 1949	43.5	P	7.2	2,400	37	.20	298	62
31bb	Nov. 3, 1947	84	A	7.3	1,980	38	.02	210	69
31db3-4	Oct. 24, 1947	48	A	7.7	1,750	23	.30	239	45
B4-59-13aa	Nov. 3, 1947	Spring	A	7.8	1,500	30	.02	167	47
13dc	July 28, 1948	120	A	7.1	1,410	31	.40	190	24
B4-60-2aa	Sept. 27, 1949	18.0	A	7.8	1,920	25	.68	180	75
6cc	Aug. 11, 1948	95	A	7.4	1,480	28	.16	108	55
24cc	Oct. 29, 1947	225	A	7.6	985	23	.05	121	18
34cc	Oct. 3, 1947	150	A	7.8	707	23	.02	73	15
									Sedgwick County,
B11-45-5ba	Aug. 4, 1948	52	A	7.5	2,120	27	0.08	249	64
18aa	Sept. 23, 1949	....	O	7.6	522	59	.08	61	10
B11-46-5bc	.....do..........	60	D, B	7.5	2,000	56	.03	207	44
18db	.....do..........	67	A	7.5	2,300	52	.03	279	46
20cb	Nov. 3, 1949	....	A	7.4	416	38	.13	51	9.5
30bb	Sept. 23, 1949	60	O	7.7	479	46	.09	58	8.7
B11-47-28bb	Aug. 3, 1948	52	A	7.4	2,090	54	.02	248	44
B12-44-27bc	Sept. 16, 1949	30	A	7.9	1,950	17	.17	174	33
B12-45-26ab1	Nov. 3, 1949	85	A	7.4	932	45	.08	108	16
29ad	.....do..........	100	A, B	7.6	513	42	.55	59	12
33ba	Sept. 23, 1949	41	A	7.5	1,810	43	.03	224	48
									Washington County,
B5-54-2bc	Aug. 19, 1948	330	P	8.4	2,010	11	0.08	10	3.2
30ab	July 29, 1948	104	A	7.7	1,720	32	.07	180	68
									Weld County,
B1-62-5aa	Oct. 20, 1947	190	L(?)	8.6	3,780	9.3	0.95	49	11
13ad	Aug. 16, 1948	76	A	7.5	566	54	.02	76	12
B1-63-13cc	Oct. 26, 1948	40.5	A	7.9	806	17	2.1	76	16
27db	Sept. 13, 1948	172	A	7.6	548	26	.02	76	13
B2-62-6ca	Aug. 31, 1948	104+	F	8.5	737	12	.02	5.0	3.9

See footnotes at end of table.

valley, between Hardin, Colo., and Paxton, Nebr.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Percent sodium
Colo.—Continued											
119	1.2	308	716	44	0.8	10	0.18	1,370	814	561	24
93	4.8	244	484	38	.9	16	....	992	549	349	27
17	8.8	186	112	17	1.2	4.3	.09	394	243	90	13
50	11	338	50	146	.7	388	.12	1,090	711	434	13
69	7.6	264	716	28	.3	58	.10	1,370	878	662	14
73	.0	238	457	13	1.0	16	.09	930	551	356	22
83	2.0	278	190	18	1.1	14	.25	579	271	43	40
180	17	398	885	87	1.0	9.2	....	1,780	981	655	28
108	6.8	378	634	55	.6	20	.16	1,340	824	514	22
222	23	424	945	71	1.2	.7	....	1,810	941	593	33
163	12	348	784	62	.7	6.1	.41	1,510	828	543	30
193	4.8	276	812	58	1.2	5.4	.35	1,480	724	498	36
187	12	400	852	64	1.0	2.8	.29	1,630	845	517	32
289	18	324	1,570	106	.6	22	.57	2,750	1,490	1,220	29
200	17	384	1,070	44	1.0	10	....	1,930	999	684	30
170	8.4	290	828	62	1.0	18	.36	1,550	808	570	31
131	11	324	721	52	.7	12	.27	1,400	781	515	26
132	.0	276	590	44	1.2	5.1	.17	1,150	610	384	32
109	6.8	272	500	39	1.1	8.0	....	1,040	573	350	29
180	7.2	380	730	56	1.4	10	....	1,450	758	446	34
159	3.2	236	564	43	3.2	6.6	....	1,090	496	302	41
90	4.0	232	340	6.0	.9	7.6	.21	724	376	186	34
55	4.4	252	134	9.0	1.1	24	.18	451	244	37	32
Colo.											
213	2.8	314	892	79	0.5	14	0.35	1,700	884	627	34
23	7.9	182	17	48	.4	25	.40	396	193	44	20
221	28	280	850	81	.4	4.8	.40	1,630	698	468	40
261	28	372	1,050	91	.4	14	.40	2,000	885	585	38
16	5.6	188	30	13	.4	15	......	298	166	12	17
23	7.0	194	27	20	.4	32	......	344	181	22	21
178	7.6	275	816	94	.4	3.4	.43	1,580	800	574	32
212	55	316	703	83	.6	12	.50	1,450	570	311	42
66	6.4	209	248	27	.4	9.8	.30	696	336	165	29
32	7.2	216	70	11	.8	7.6	....	354	197	20	25
175	22	360	750	70	.4	19	.40	1,530	757	462	33
Colo.											
484	1.6	[e]710	256	167	1.6	0.1	3.6	1,290	38	0	96
132	15	385	612	43	.6	2.1	.35	1,280	729	413	28
Colo.											
764	6.0	[c]360	56	1,060	0.7	13	0.20	2,150	168	0	90
26	4.0	210	89	11	.4	22	.18	390	239	67	19
74	8.0	262	136	38	1.6	10	.08	568	256	41	38
42	4.4	216	135	17	.4	6.9	.16	422	243	66	27
196	.0	[c]510	.0	25	1.4	1.9	.41	510	29	0	94

Analyses of ground water in the lower South Platte River

Well no.	Date of collection	Depth of well (feet)	Geologic source	pH	Specific conductance (micromhos/cm at 25°C)	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)
									Weld County,
B2-62-6cb2	Nov. 6, 1947	....	A	7.6	544	25	0.02	66	15
19cd	Nov. 5, 1948	87	A	7.8	1,510	17	.16	200	31
B2-63-2cc	July 27, 1948	81	A	7.6	882	25	.02	83	22
25ab2	July 26, 1948	80	A	7.4	1,760	28	.03	260	39
25cc1	....do...........	74	A	7.6	1,690	26	.05	231	38
31aa	Aug. 31, 1948	650	P	8.0	1,020	12	.10	3.5	2.6
33dd2	July 30, 1948	87	A	7.9	1,200	24	.05	137	28
B3-62-15ba	Aug. 30, 1948	84	A	7.5	462	21	.02	60	13
B4-61-1bb2	Dec. 6, 1948	20	A	7.4	2,090	32	.16	146	61
B4-63-4ab	Aug. 11, 1948	85	A	7.2	2,520	40	.16	257	72
									Deuel County,
B12-43-24ba	Sept. 16, 1949	52	A	7.4	620	39	0.24	68	14
B12-44-18bb	....do...........	92	A, B	7.3	473	54	.40	58	9.6
B13-41-31cd1	....do...........	40	A	7.5	1,060	19	.06	106	24
B13-42-25dd1	Oct. 27, 1949	29	O, A	7.5	361	34	.62	47	7.3
25dd2	Sept. 16, 1949	Spring	O, A	7.2	266	42	.09	38	4.5
36cb	Aug. 5, 1948	26	A	7.7	1,970	27	.05	196	52
B13-45-23cb2	Sept. 16, 1949	100	A, B	7.3	571	53	.16	54	14
									Keith County,
B12-40-17aa	Sept. 15, 1949	140	O	7.4	227	15	5.3	30	7.5
B12-41-7ba	Aug. 11, 1949	108	A	7.8	1,310	34	.06	131	32
B13-35-5ca	Oct. 25, 1949	109	A	7.7	1,200	30	.04	161	33
7bb	Sept. 14, 1949	72	A	7.4	1,700	12	.08	176	53
8bd	....do...........	12	A	7.0	1,440	26	.06	165	33
B13-36-16bb	....do...........	....	A	7.6	366	24	.06	49	7.6
20ad	....do...........	....	O	7.3	399	22	1.1	56	9.5
B13-37-3ab	Sept. 15, 1949	....	A	7.2	1,700	13	.04	179	56
10cd	Sept. 14, 1949	90	A	7.4	329	41	.10	40	7.5
B13-38-4dd	....do...........	12	A	7.2	2,080	24	.10	188	58
6ca2	Oct. 26, 1949	187	A, O	7.4	482	45	.16	54	12
31ab	Sept. 14, 1949	225	O	7.6	301	41	12	41	8.8
B13-39-1bc	Sept. 15, 1949	140	A	7.4	411	26	.08	53	8.5
13ac	Sept. 14, 1949	216	A	7.2	516	38	.06	70	14
B13-40-14bb	Sept. 15, 1949	124	A	7.3	511	23	2.0	72	9.8
22aa	....do...........	61	A	7.3	432	48	.14	60	8.8
27bb	....do...........	....	A	7.4	517	30	.09	67	13
32dc	....do...........	195	A	7.2	1,490	36	.44	162	35
B13-41-13cc	Sept. 16, 1949	....	A, O	7.7	242	45	.07	29	5.7
34cd	....do...........	43.6	A	7.6	1,620	47	.20	180	35
B14-37-34ac	Sept. 15, 1949	183	O	7.3	392	18	.50	55	7.8

[a] Includes equivalent of 12 ppm of carbonate (CO_3).
[b] Includes equivalent of 14 ppm of carbonate (CO_3).
[c] Includes equivalent of 20 ppm of carbonate (CO_3).
[d] Includes equivalent of 15 ppm of carbonate (CO_3).
[e] Includes equivalent of 24 ppm of carbonate (CO_3).

valley, between Hardin, Colo., and Paxton, Nebr.—Continued

Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$ Total	Hardness as $CaCO_3$ Noncarbonate	Percent sodium
Colo.—Continued											
40	0.0	183	126	7.0	0.6	9.4	0.15	375	226	76	28
113	9.2	234	516	90	1.6	21	.12	1,120	626	434	28
82	2.0	219	252	20	.8	13	.12	618	298	118	37
103	4.0	307	612	108	.2	32	.30	1,340	809	557	22
135	6.0	326	548	90	.2	32	.50	1,270	733	466	28
290	3.2	673	6.0	60	1.6	2.5	.00	708	19	0	96
107	3.2	297	300	70	.4	9.1	.42	870	457	213	34
31	4.0	182	99	6.0	.6	10	.00	382	203	54	24
268	7.2	374	774	73	1.5	.7	.17	1,550	615	308	48
277	.4	478	964	108	.6	20	....	1,980	937	545	39
Nebr.											
36	14	236	75	18	0.4	21	....	410	227	33	24
25	9.4	246	28	7.6	.6	14	0.20	342	184	0	22
86	19	240	315	41	.4	18	.50	800	363	166	33
14	6.8	154	29	10	.6	16	....	248	148	22	16
8.2	12	152	12	4.0	.8	3.7	.30	201	114	0	12
182	8.8	249	808	66	1.0	5.8	.57	1,470	703	499	36
48	13	320	35	12	.8	4.0	.30	404	193	0	33
Nebr.											
7.6	8.0	135	9.8	3.6	0.6	3.2	0.20	152	106	0	12
93	8.8	263	392	39	.5	5.8	.09	940	459	243	30
53	3.2	178	452	43	.3	5.4	....	916	537	391	18
155	14	268	680	69	.8	6.6	.40	1,300	657	437	33
119	22	226	533	68	.4	5.1	.20	1,080	547	362	31
15	16	197	26	9.8	.6	7.4	.20	314	154	0	16
12	16	191	28	21	.6	6.0	.10	314	179	22	12
158	20	320	648	47	1.4	30	.60	1,310	677	415	33
17	7.2	182	18	5.0	.4	5.6	.20	242	131	0	21
229	14	315	872	73	1.0	1.8	.30	1,620	708	450	41
26	8.0	210	60	11	.5	4.9	....	340	184	12	23
9.4	7.2	173	11	3.2	.6	5.4	.20	228	139	0	12
18	15	202	37	10	.6	7.6	.20	320	168	2	17
17	7.8	180	92	21	.4	6.2	.20	404	232	84	13
18	18	196	57	20	.4	28	.40	382	220	59	14
28	8.8	213	57	12	.6	7.4	.20	346	158	0	24
20	6.6	144	110	15	.4	17	.20	394	221	103	16
144	19	276	563	50	.4	3.8	.30	1,150	548	322	35
6.4	9.6	132	4.0	1.0	1.2	4.9	.30	176	96	0	11
150	27	306	595	58	.4	13	....	1,260	593	342	34
11	11	154	62	12	.6	2.8	.20	296	170	44	12

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