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GROUND-WATER RESOURCES OF THE WOOD RIVER UNIT OF THE LOWER PLATTE RIVER BASIN NEBRASKA

By C. F. Keech

Prepared as Part of a Program of the Department of the Interior for Development of the Missouri River Basin

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GROUND-WATER RESOURCES OF THE WOOD RIVER UNIT OF THE LOWER PLATTE RIVER BASIN, NEBRASKA

By Charles F. Keech

ABSTRACT

The Wood River unit is mainly terrace land that lies on the north side of the Platte River between the city of Kearney and the town of Wood River. As irrigation from pumped wells is practiced extensively in the unit and is a major factor in the economy of the area, it is important to know the amount of water pumped annually from the ground-water reservoir and if the amount of discharge is greater than the annual recharge.

Measurements of the water level in several observation wells in the area have been made periodically since the fall of 1930. These records show that in parts of the Wood River unit the water level has lowered since 1930; the net decline during the period from 1930-49 was about 6.5 ft in one well situated about 4 miles north of the town of Wood River. This indicates that the average annual discharge is greater than the average annual recharge, at least in a local area.

Water is discharged from the ground-water reservoir by pumping from wells, by seepage into the Platte River and into Wood River, by underflow eastward, and by transpiration and evaporation in the areas of shallow depths to water. All irrigation, domestic, stock, municipal, and industrial water supplies are obtained from wells. The ground water is recharged principally by precipitation that falls within the area, by effluent seepage from the Platte River and perhaps locally from Wood River, by underflow from the west, and by return flow from a part of the water pumped from wells for irrigation.

A field census, made in the summer of 1948, showed 1,113 irrigation wells in the Wood River unit in 1947. Of this total, the 472 electrically driven pump installations were operated for an average of

442 hr during the 1947 irrigation season. Discharge measurements were made on 142 representative irrigation wells; the average yield was 856 gpm. The average electrically pumped well discharged 69.7 acre-ft of water during 1947, the average amount of water applied to each irrigated acre was 1.52 acre-ft and the total annual pumpage was 77,600 acre-ft. Pumping-plant efficiencies were determined for 86 electrically powered pumping plants; the average plant efficiency was 57.3 percent.

The report contains three maps, one showing the locations of all irrigation wells and the depths to water below land surface, another showing contours of the water table as of March and September 1948, and another showing the change in ground-water levels for the period between 1931 and 1948.

INTRODUCTION

Location and Extent of the Area

The Wood River unit in Buffalo and Hall Counties, Nebr., is a component part of the "Grand Island division" of the lower Platte River basin for which the United States Bureau of Reclamation has proposed a plan for full development of the water resources. (See fig. 1.) The Wood River unit includes that part of the Platte River valley that lies north of the Platte River and extends from near Kearney on the west to approximately 1 mile east of the town of Wood River where a canal route normal to the axis of the valley has been proposed. It also includes the land in the Wood River valley below Amherst. The area totals about 233 sq miles. The Platte Valley segment is about 25 miles long, and the Wood River segment is about 13 miles long. The Wood River valley ranges in width from 1 to 2 miles whereas the Platte River valley ranges in width from about 7 miles at Kearney to 12 miles at Wood River. The Platte Valley segment of the unit is traversed by the Wood River, which enters the Platte River valley at a point about 4 miles north of Kearney and flows eastward, nearly parallel to the Platte River, about 5 miles to the south.

The city of Kearney is adjacent to the west edge of the area and, according to the 1950 United States census, has a population of 12,106. Populations in 1950 of the main towns in the area are as follows: Shelton, 1,032; Gibbon, 1,059; Wood River, 856; and Riverdale, 116.

Agricultural Development and Irrigation

Before the advent of the settlers the area included in the Wood River unit was covered with a dense luxuriant growth of mixed grasses, which tended to develop very fertile soils. The materials on which these soils are developed are extremely variable; they range in texture from clay to sand and generally are more sandy near the Platte River.

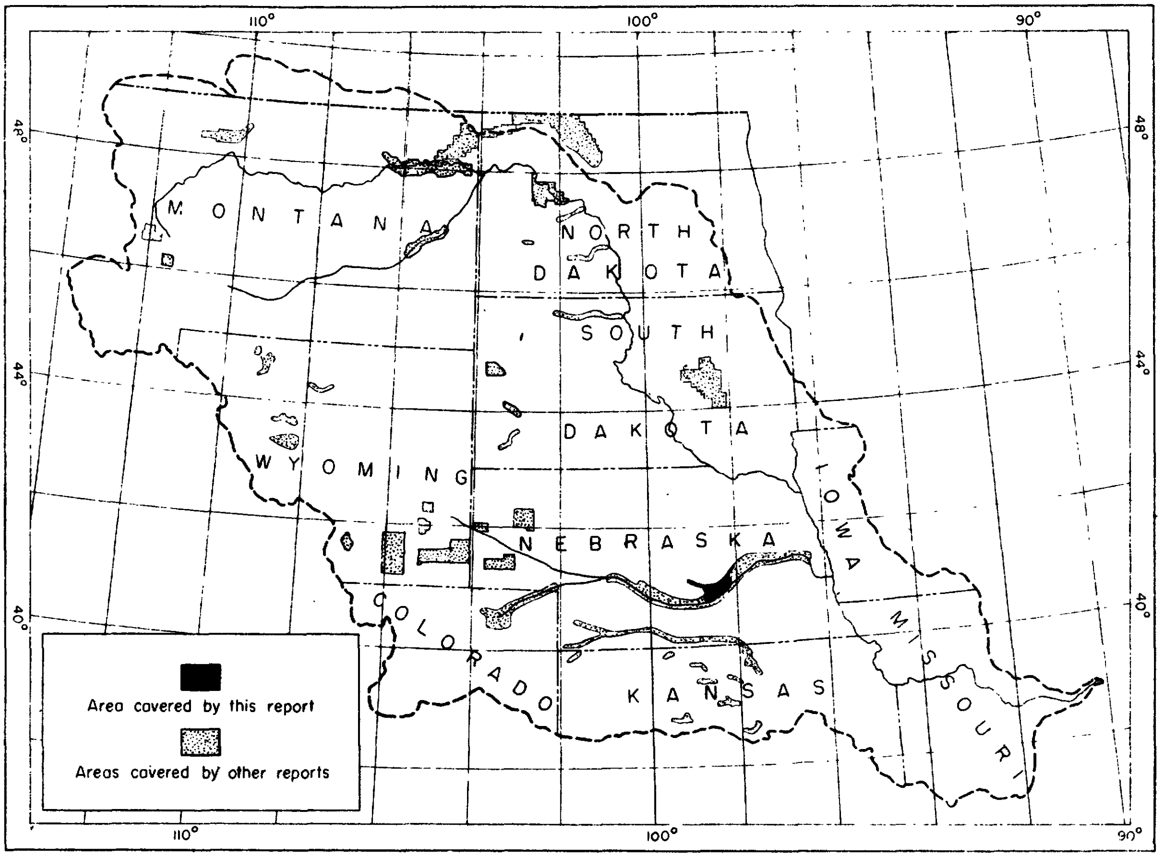

Figure 1.--Map of the Missouri River basin showing areas in which ground-water studies have been made under Missouri River basin program.

The soils of the Wood River unit have been mapped and described in soil survey reports of Buffalo County (Hayes and others, 1928) and Hall County (Veatch and Seabury, 1918).

The first farmers in the area were Mormons who had settled in 1853 along the Oregon Trail near the present site of the town of

Shelton. Most of the early white inhabitants were cattlemen, but when other settlers arrived and appropriated the land for crop uses, the cattlemen moved farther west. Agriculture was developed slowly by the pioneers who suffered many setbacks. The lack of markets and transportation facilities was a retarding influence and the grasshopper plagues of the middle 1870's were almost disastrous. Severe droughts in the 1890's resulted in total crop failures in some localities. Prairie hay has been an important crop in the valley since agriculture was first practiced in the area. Wild hay is still important, although it has been replaced largely by alfalfa, except in the marshy and swampy areas near the Platte River.

It was not until the late 1920's that some of the farmers began to realize the possibilities of ground-water irrigation and, hence, began to install irrigation wells. The first wells were hand-dug by the farmers and were cased with lumber, which was replaced later by masonry or concrete. Some of these early wells are still in use, but most of them have been replaced.

At first many farmers were reluctant to accept the introduction of irrigation in this area, largely because it entailed additional labor, thus necessitating a change from large-farm to small-farm operation. The severe drought of the 1930's, however, prompted farmers to turn quickly from dry-land farming to irrigation, and wells were installed as rapidly as the available drillers could construct them. The deep-well turbine-type pump had recently been improved and soon all other kinds including vertical and horizontal centrifugal pumps became almost obsolete. Development of modern power units added much impetus to the growth of pump irrigation and, more recently, the program of rural electrification with its low electric power rates contributed to this growth. At the present time nearly half the wells are powered by electricity.

Purpose and Methods of the Investigation

The pumping from wells for irrigation in the Wood River unit imposes heavy demands on the ground-water reservoir. Records of water levels, which have been measured periodically in observation wells since 1930, indicate that the water level has been declining in certain parts of the area, particularly in the higher terrace areas northwest of the town of Wood River. Both local and Federal organizations have formulated tentative plans for the construction of irrigation canals to bring water into the area from storage reservoirs above the valley in the Wood River basin. They have proposed the establishment of a balanced gravity-well irrigation system which would irrigate lands not now under irrigation and which would contribute to the ground-water supply by means of infiltration to the water table from surface-water irrigation. At the present time no surface-water developments are in the Wood River unit.

Almost every development of surface-water irrigation in the Platte River valley has caused perplexing drainage problems, and in some places no adequate provision has been made for their solution; as a result, some agricultural lands have become waterlogged or damaged by seepage. If surface-water irrigation is developed in the Wood River unit, drainage problems will probably arise, especially in areas where the water table is near the land surface. Thus, the continued collection of records of ground-water levels will become increasingly important.

The U. S. Bureau of Reclamation has determined that a total of 120,768 acres of land situated in the Wood River unit could be irrigated by a well-gravity system. Of this total 53,615 acres, or a little less than half, are presently irrigated from wells. The balance, or 67,153 acres, represents lands widely scattered over the entire unit that are not now irrigated but are under cultivation.

Before the proposed plans can be developed, an appraisal of the water resources of the Wood River unit must be made. Earlier investigators of the ground-water resources of the Platte River valley estimated the total quantity of ground water being pumped for irrigation; however, these estimates were based on a minimum of data. In order to obtain data for a more accurate appraisal, an inventory of all pumping plants and their ground-water withdrawals was begun in the summer of 1948. For this inventory, about 1,000 well operators were interviewed. The following information for the 1947 season was obtained: estimates of the number of hours of operation and of the yields of the wells; the number of acres irrigated by the wells; and the crops irrigated by the wells.

In addition to information reported on pumping plants, the normal operating discharges of 142 wells were measured. A Hoff current meter was used for measuring yields, and it proved to be ideal for rapid measurements because it is quite adaptable to the different outlet conditions and to the variable discharges of each well.

Wherever it was possible, the pumping level in each irrigation well was measured by use of an electrical sounding device. Power input was determined for all electrically powered pumps from which discharge was measured.

A record of power consumption for each electrically powered installation was obtained either from the Rural Electrification Administration offices at Grand Island or Kearney or from the Consumers Public Power District office at Kearney. These records gave the billed horsepower and the kilowatt-hour consumption; the billed horsepower is 90 percent of the rated horsepower for the plant. All pump installations served by the Rural Electrification Administration in Buffalo County were tested at least once each season to determine the rated horsepower input of each plant; thus, the records obtained are believed to be up to date and reasonably accurate. Installations in Hall County are not checked every year, but all have been tested in recent years and the horsepower rating is believed to be accurate within 10 percent. From these records the average hours of operation for each of the 472 electrically powered pumping plants in the area were determined to be 442 by dividing the total kilowatt hours for the season by the rated horsepower multiplied by 0.746 (1 hp = 0.746 kw).

Approximately 43 percent of all wells in the area are powered with electricity. It is reasonable to assume that the average operating time for engine-driven units closely approximates that of the electrically powered units and that a close estimate of the average operating time for all plants can be obtained from the records of electrically pumped wells. Each electrically powered well was operated for an average of 442 hr in 1947.

Well-Numbering System

Wells are numbered in this report according to their location within the land subdivisions of the General Land Office survey of the area. (See fig. 2.) The first numeral in the well-location number indicates the township, the second the range, and the third the section. The lower-case letters that follow the section number indicate the position of the well within the section; the first indicates the quarter section, the second the quarter-quarter section, and the third the quarter-quarter-quarter section. These letters are applied in a counterclockwise direction beginning with "a" in the northeast quadrant.

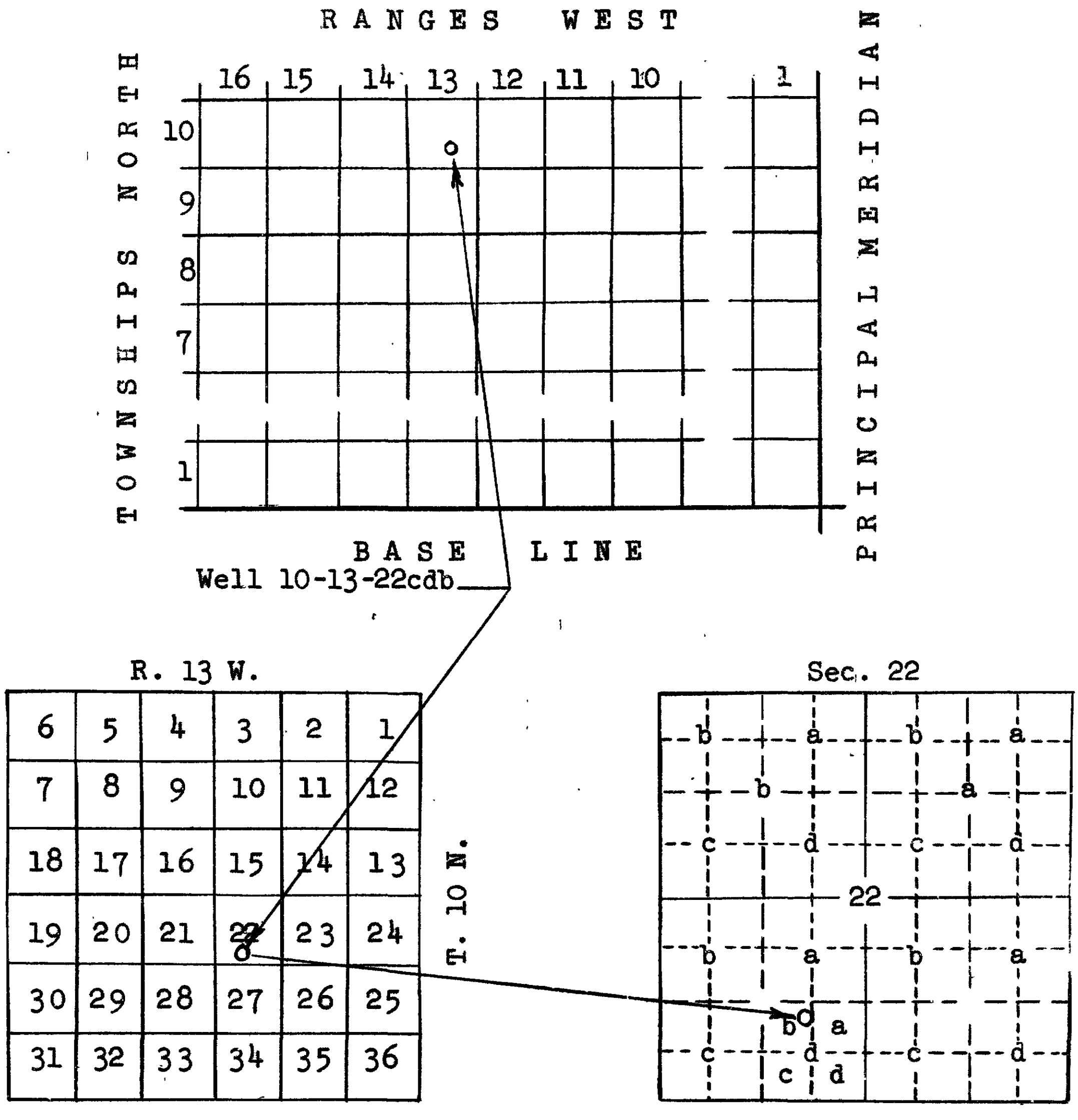

Figure 2.--Sketch illustrating well-numbering system.

A numeral following the lower-case letters indicates the number of the well in sequence as inventoried within the tract of land delimited by the last letter; if only one well is located within this tract, no numeral is shown.

Acknowledgments

The investigation in the Wood River unit was under the general supervision of A. N. Sayre, Chief of the Ground Water Branch of the United States Geological Survey, and G. H. Taylor, regional engineer of the Ground Water Branch in charge of the Missouri River basin groundwater investigations. The study was under the direct supervision of H. A. Waite, district geologist in charge of ground-water investigations in Nebraska.

The U. S. Geological Survey and the Conservation and Survey Division of the University of Nebraska have been cooperatively investigating the ground-water resources of Nebraska since July 1, 1930. In 1945 the Geological Survey expanded its program of ground-water studies in connection with the program of the U. S. Department of the Interior for the development of the Missouri River basin. This study is a part of the program of investigations by the Ground Water Branch being made in the Missouri River basin.

The following personnel of the Lincoln office participated in the field work and in the preparation of the report: R. S. Brown, F. E. Busch, G. C. Chipps, R. L. Schreurs, F. G. Schnittker, and H. S. Unger.

Appreciation is expressed to all those who were of assistance in the course of the field investigation. Personnel in the Grand Island office of the U. S. Bureau of Reclamation were very cooperative at all times. Personnel in the Grand Island and Kearney offices of the Rural Electrification Administration and in the office of the Consumers Public Power District at Kearney furnished data on the electric-power consumption of the electrically powered pumping plants in the area. The collection of statistics on irrigation wells necessitated a visit to almost every farm in the area and an interview with almost every farm operator. The farmers willingly supplied information about their wells and irrigation practices.

GEOLOGIC FORMATIONS

The geologic formations exposed at the surface in the Wood River unit are unconsolidated sediments of Recent or Pleistocene age. These unconsolidated sediments, collectively referred to as mantle rock,

Table 1.--Generalized section of the geologic formations in the Wood River unit, Nebr.

System	Series	Subdivision (Nebraska Geological Survey)	Thickness (feet)	Character and distribution	Water supply
Quaternary	Recent	Superficial alluvium, loess, dune sand, topsoil	Variable	Reworked sand and gravel in the river channel and its flood plain; isolated wind deposits of clay, silt, and sand; widespread soils.	Significant only as transmitting agent in recharge to ground water.
	Pleistocene	Bignell loess	0-20	Wind deposits of locally derived grayish silt on terraces and upland border of valley.	Significant only as transmitting agent in recharge to ground water.
		Unconformity			
		Peorian loess	30-45	Wind deposits of silty clay (loess), massive, yellow to buff; widespread on upland surfaces and on terraces in the valley; some dune sand.	In upland areas significant only as transmitting agent in recharge to ground water; occurs below water table in parts of valley but does not yield water readily.
		Todd Valley formation	0-50	Fine gray sand and gravel deposited essentially as valley fill; present at places in Platte Valley.	May yield water to wells where present below water table.
		Unconformity			
		Loveland formation	20-50	Stratified silt and clay with laminae of fine sand in valley phase of deposition; massive reddish-brown silt and clay (loess) in upland phase; capped by persistent "old soil."	In upland areas significant only as transmitting agent in recharge to ground water; Occurs below water table in parts of valley but does not yield water readily.
		Crete formation	0-30	Channel-fill deposit of sand and gravel modified by locally derived materials; present in places under bottom lands of tributary valleys and in remnants of channel fill along Platte River valley side slopes.	May yield water to wells where present below water table.
		Unconformity			
		Sappa formation	5-50	Greenish silty clay of aqueous-eolian deposition, capped by old soil; generally present at high levels in the Platte River valley side slopes.	Not a source of water supply.
		Grand Island formation	20-75	Stream-deposited sand and gravel; upper part underlies lower Platte River valley side slopes, lower part is below Platte River valley floor in most of the area.	Yields abundant supplies of water where present below water table.
		Unconformity			
		Fullerton formation	5-30	Silt and calcareous clay grading locally into fine sand; of fluvial-eolian origin; capped with peat in some places in the lower Platte River valley.	Not a source of water supply.
		Holdrege formation	0-50	Stream-deposited sand and gravel; underlies much of Platte River valley.	Yields abundant supplies of water throughout area.
		Unconformity			
Tertiary	Pliocene	Ogallala formation	0-250	Stream-deposited interlaminated gravel, sand, silt, and clay; some beds lime-cemented.	Yields abundant supplies in some areas in Nebraska.
		Unconformity			
Cretaceous		Pierre shale	150-400	Dark clay shale with some shaly chalk and limestone and thin sandstone, where not removed by post-Cretaceous erosion.	Not a source of water supply.
		Niobrara formation	350-400	Lead-gray and yellow shaly chalk in upper part (Smoky Hill chalk member); massive gray to yellowish-gray limestone in lower part (Fort Hays limestone member).	Not a source of water supply.

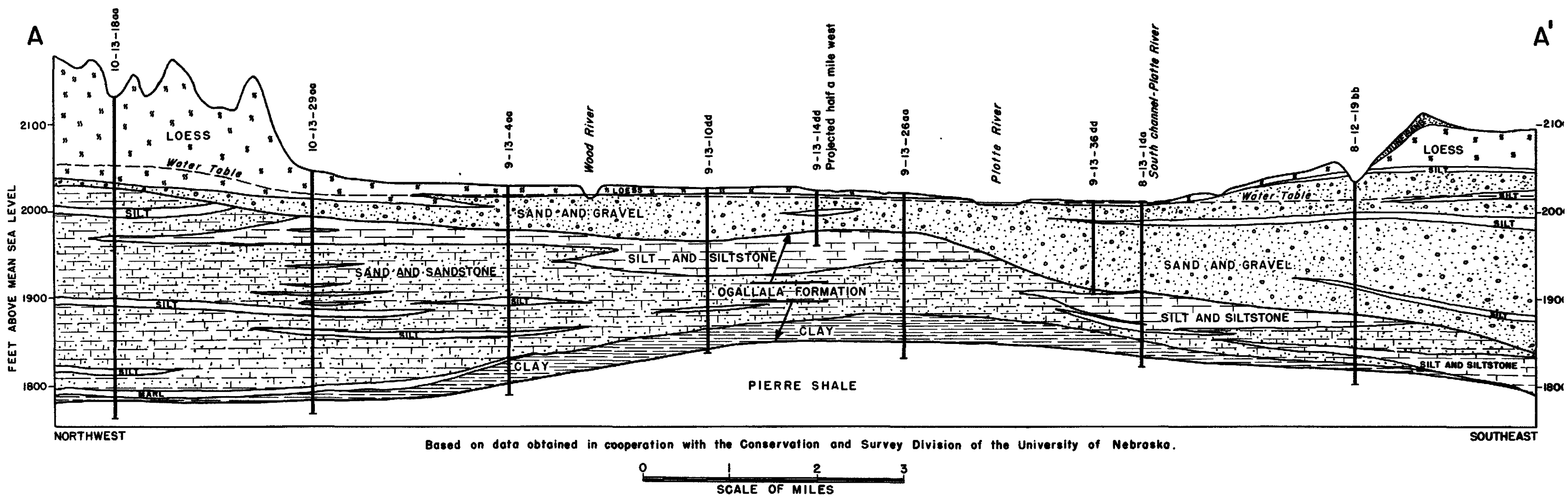

Figure 3.—Geologic section across the Platte River valley near Shelton, Nebraska

comprise wind-blown loess and dune sand, gravel, silt and clay deposits. They rest on bedrock of Tertiary or Cretaceous age, consisting of alternating layers of shale, mudstone, sandstone, and limestone, which are essentially flat-lying or gently warped.

The named geologic formations that constitute the mantle rock and the underlying bedrock in the Wood River unit are listed in proper sequence in table 1, which gives their range in thickness, lithologic character, and importance as sources of water supply.

The drilling of deep test holes by means of a portable hydraulic rotary drilling rig has been and is an integral part of the State-Federal cooperative study of the ground-water resources of Nebraska. A geologic section A-A', based on test holes drilled across the Platte River valley near Shelton, is shown in figure 3.

The geologic character of the sediments underlying the Wood River unit is shown by the following log of a test hole drilled near Wood River in 1945 by the Conservation and Survey Division of the University of Nebraska in cooperation with the U. S. Geological Survey:

Log of test hole 9-11-8bc drilled October 31, 1945, by the Conservation and Survey Division of the University of Nebraska in cooperation with the U. S. Geological Survey about 3.5 miles south and 0.5 miles east of Wood River, Nebraska. Log based on driller's log and sample study by E. C. Reed.

	Thickness (feet)	Depth (feet)
Quaternary		
Pleistocene and Recent, undifferentiated		
Soil, silty clay, dark-gray to black	2.5	2.5
Silt, medium, light-gray, in part sandy	1.5	4.0
Sand and gravel, medium to coarse gravel, feldspathic, dark brownish-gray; contains scattered pebbles	16.0	20.0
Sand and gravel, coarser than above, yellow-stained, some pebbles; medium to coarse sand and gravel intermixed	10.0	30.0
Sand and gravel, coarse, pinkish gray; contains feldspar pebbles and some coarse sand intermixed; sand and gravel in about equal parts	20.0	50.0
Sand and gravel, similar to above; very coarse gravel; many feldspar pebbles grading larger with depth	10.0	60.0

Log of test hole 9-11-8bc--Continued

	Thickness (feet)	Depth (feet)
Quaternary--Continued		
Pleistocene and Recent, undifferentiated--Con.		
Sand and gravel; sand is medium-fine to coarse; gravel is mostly fine to medium-coarse; slightly fewer pebbles............	12.5	72.5
Clay, slightly silty, noncalcareous, light greenish-gray............................	4.0	76.5
Sand, medium to coarse, light-gray to pinkish gray, contains fine to medium feldspathic gravel.........................	2.5	79.0
Clay, silty to clayey silt, noncalcareous, medium-gray..............................	1.0	80.0
Silt, noncalcareous, medium light gray to slightly pinkish..........................	10.0	90.0
Silt, calcareous, medium light-gray to slightly pinkish; some light-gray speckled limy, concretionary material (harder concretionary zone encountered 120-123 ft and 129-129.1 ft)............................	45.0	135.0
Silt, as above, calcareous, with concretionary limy material and common medium to coarse sand (probably represents base of Pleistocene sediments)....................	11.5	146.5
Tertiary		
Ogallala formation		
Siltstone, sandy, lime-cemented, medium light-gray; common limy rootlets; fairly common sand, as above, probably cave.............	3.5	150.0
Silt, medium light-gray and fairly common fine to medium sand; some limy siltstone..	15.0	165.0
Siltstone, sandy, calcareous, light-gray; fairly common rootlets (drilled harder from 163-170 ft, drill stem chattered; also drilled harder zones from 171-171.5 ft and from 177.5-179 ft..................	15.0	180.0
Sand, medium to medium-coarse, light-gray; light-gray to white calcareous sandy siltstone..................................	5.0	185.0
Sand, medium-grained, light-gray; contains some fine sand and silt..................	5.0	190.0
Clay or clay shale, noncalcareous, light-gray to light greenish-gray, in part yellowish; some limy material (probably Tertiary)....	5.0	195.0

Log of test hole 9-11-8bc--Continued

	Thickness (feet)	Depth (feet)
Cretaceous		
Niobrara formation		
Fort Hays limestone member		
Limestone, medium light-gray to ochre yellow; mostly highly weathered and in part slightly siliceous..................	5.0	200.0
Total depth of test hole..................	200 ft	
Depth to water below land surface, Nov. 7, 1945....................................	4.9 ft	

Bedrock Formations

The Ogallala formation, of Pliocene age, immediately underlies the Pleistocene sediments in the Wood River unit. It rests on the Niobrara formation, of Cretaceous age, in the vicinity of the town of Wood River and on the Pierre shale, also of Cretaceous age, in the western part of the Wood River unit near Kearney. The Pierre shale is near its easternmost limit in this region and is not present in the eastern part of the unit.

Cretaceous System

The Niobrara formation is subdivided into two members. The Fort Hays, or lower member, consists of gray to yellowish-gray massive limestone, and is 40 to 60 ft thick. The overlying Smoky Hill member consists of lead-gray and yellow shaly chalk and is from less than a foot to about 350 ft thick.

The Pierre shale consists of black, gray and brownish clay shale, thin layers of bentonite, indurated shaly chalk, well-defined concretionary zones, and, in the upper part, thin sandstones. It ranges in thickness from about 150 to about 400 ft except where it thins to a featheredge as a result of post-Cretaceous erosion.

Tertiary System

The Ogallala formation, of Pliocene age, is the only Tertiary formation underlying the Wood River unit. It is of continental origin, having been laid down by streams, and consists of interbedded hard and soft layers of sandy gravel, sand, silt and clay. Some layers are cemented by lime, but others are relatively unconsolidated. The Ogallala is progressively finer-textured in an eastward direction. These finer-grained deposits, consisting principally of silt and silty sandstone, have been described as the Seward facies (Condra, Reed and Gordon, 1950, p. 15) of the Ogallala formation and underlie the Pleistocene deposits throughout the Wood River unit. The maximum thickness of the Ogallala formation in the Wood River unit is approximately 250 ft although the formation reaches a maximum of about 400 ft in the Platte River valley farther west.

Mantle-Rock Formations

Holdrege formation.--The oldest Pleistocene deposits in the area consist of sand and gravel principally in the valleys developed on the pre-Pleistocene surface. The deposits are of wide-spread occurrence in south-central Nebraska, originally forming a constructional plain interrupted only by the high divides of the ancestral drainage basins. These fluviatile sediments coalesced eastward, where they graded progressively into outwash deposits and till deposited during the Nebraskan stage of glaciation. The fluviatile material consists mostly of erosional products carried in by streams from higher plains and mountains to the west. These basal Pleistocene deposits, referred to as the Holdrege formation, range in thickness from a featheredge to about 50 ft in the Wood River unit. The lower part of the Holdrege is continuous with the pre-Nebraskan sand and gravel and the upper part is correlative with the Nebraskan till.

Fullerton formation.--Following the retreat of the Nebraskan glacier, the surface of the sand and gravel of the Nebraskan till were exposed to weathering and erosion with the concurrent development of soil and the local deposition of fine to coarse sediments in eroded areas. These deposits have been named the Fullerton formation. They range in thickness from 5 to about 30 ft. The Fullerton formation is coextensive with the underlying Holdrege formation and is likewise discontinuous, owing to erosion both prior to and since the deposition of the formations that overlie it. The Fullerton formation is equivalent in age to silts of the Aftonian stage of eastern Nebraska.

Grand Island formation.--The Grand Island formation, like the Holdrege formation, is composed mainly of alluvial sand and gravel and some glacial outwash, but its upper part is composed principally of fine sand. Deposited during the advance and subsequent retreat of the Kansan glacier, this formation ranges in thickness from about 20 to 75 ft in the Wood River unit. The Grand Island formation is coextensive with the underlying Pleistocene deposits but it is more continuous. It is exposed in the bluffs and gullies on the south side of the Platte River valley from Shelton westward and in this area it is the source of sand which has been reworked by the wind into sand dunes on the south side of the valley. The lower part of the Grand Island formation and the Holdrege and Fullerton formations lie below the floor of the Platte River valley in the Wood River unit.

Sappa formation.--During the quiescent stage that followed the Kansan glaciation, clay and fine sand were deposited on the Grand Island formation. These deposits, named the Sappa formation (formerly called the Upland formation) range in thickness from about 5 to 50 ft or more. Although probably continuous at the time of deposition, this formation was subsequently subjected to weathering and eroded to the extent that it was reduced to more or less patchy occurrences before the deposition of the overlying formations.

Crete formation.--Post-Kansan erosion reduced the Grand Island-Sappa constructional plain to a deeply and maturely dissected surface. The Crete formation (Condra, Reed and Gordon, 1950, p. 24), consisting mostly of sand and gravel modified by materials derived locally from valley slopes, was then deposited in the channels. The thickness of the formation is as much as 30 ft.

Loveland formation.--The early phase of deposition represented by the Crete formation gave way to widespread deposition of the Loveland formation, which consists of stratified silt and clay with some laminae of very fine sand within the valleys and massive reddish-brown loess mantling the upland surfaces. The deposition of sand and gravel of the Crete formation and of loess and silt of the Loveland formation with subsequent soil formation took place during the period of the advance and retreat of the Illinoian glacier. The Loveland formation ranges in thickness from about 20 to 50 ft.

Todd Valley formation and Peorian loess.--The Loveland constructional plain was subjected to mature dissection, and deposition was again resumed, with aggradation of valleys by the fine gray sand and gravel of the Todd Valley formation. This phase of sedimentation gave way to widespread deposition of the buff to yellowish Peorian loess, which, in some upland areas, ranges in thickness from about 30 to 45 ft or more. One fairly thick soil has been recognized on top of the Peorian loess, and other traces of old soils have been recognized in some places. The Todd Valley formation is of Iowan age and the Peorian loess is of Iowan to Mankato age.

Bignell loess.--Soil formation on the surface of the Peorian loess was followed by deposition of the Bignell loess (Schultz and Stout, 1945), which consists of grayish silt, on terraces and uplands bordering the Platte and other valleys. The thickness of this loess is as much as 20 ft and its age is probably Mankato to Recent.

Recent deposits.--No sharp line divides Recent deposits from those of Pleistocene age. Recent alluvium of the Wood River unit is restricted to the bottom lands and is limited to a few feet of reworked surface materials. In addition to alluvial deposits, Recent deposits consist of wind-blown loess and of topsoil developed on the valley terraces and upland surfaces.

CLIMATE

Precipitation

The mean annual precipitation at Kearney from 1894 to 1948 was about 23.3 in. The minimum annual recorded precipitation was 11.76 in. in 1934, and the maximum was 40.07 in. in 1915. The heaviest precipitation usually accompanies local thunderstorms in the summer. Normally about 65 percent of the rainfall occurs during the growing season, and in the early part of the summer rainfall is fairly evenly distributed, but late in July and through August and September it generally is less evenly distributed. Droughts frequently occur in late summer when the corn, which is the principal crop, is tasseling. Because this is a critical time in crop growth, irrigation is almost always needed for full development, even though the total annual precipitation may be above normal. The average annual snowfall is about 30 in.

Precipitation records were maintained at Kearney for the period of 1849-94 and at Grand Island for the period 1888-94. The records from 1895 to date are complete. The annual precipitation records since 1895 at Kearney, the monthly maximum, minimum, and average precipitation at Kearney and the cumulative departures from average precipitation at Kearney and Grand Island from 1894 to 1948 are shown in figure 4. The downward trend of the cumulative departure curves from 1907 to

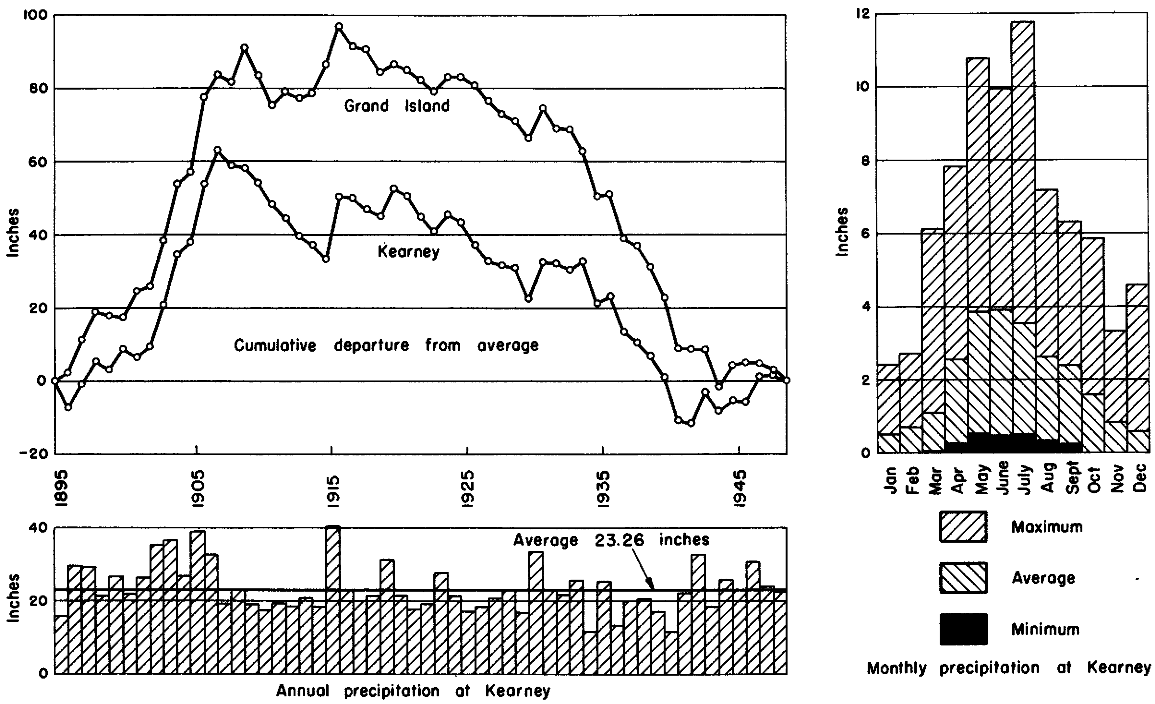

Figure 4.--Cumulative departure from average precipitation at Grand Island and Kearney and monthly and annual precipitation at Kearney during the period 1895-1948.

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

1942 at Kearney and from 1915 to 1944 at Grand Island show that the annual precipitation during these periods was generally below the average for the period of record. The cumulative departure graph indicates that the drought, usually associated with the 1930's, actually began in 1916, became increasingly severe in the early thirties, and reached its climax in 1940. Many of the crop failures during this period were not due to the deficiency in annual precipitation but were due to the unfavorable distribution of precipitation throughout the year. The distribution of the rainfall is not consistent from month to month nor from year to year; consequently, maximum crop production is and will be dependent upon additional water supplied by irrigation.

The prevailing winds are from the south in summer and from the northwest in winter; however, winds from other directions are frequent. The winds are usually moderate to strong. In summer, they are often accompanied by high temperatures and low relative humidity, both of which cause rapid evaporation of the soil moisture. High winds, strong enough to damage property and trees, occasionally occur with thunderstorms. Hail often accompanies the thunderstorms and frequently damages the crops. During the 1948 field season, when data for this report were being collected, hail storms did much damage to crops, particularly to corn. Tornadoes rarely occur in the Wood River unit.

Temperature

The mean average temperature of the area is about 50°F. Temperatures of more than 100°F are common in midsummer; winter temperatures often drop below zero, and sometimes they drop as low as -30°F.

The average growing season is about 160 days. April 29 is the average date of the last killing frost in spring although, in 1947, a killing frost occurred on May 29, which represented the latest of record. The average date of the first killing frost in the fall is October 5; September 12, 1902, is the earliest date of killing frost on record.

FLUCTUATIONS OF THE WATER TABLE

The water table beneath the Wood River unit fluctuates in essentially the same way as does that of any surface-water impoundment; during some periods the ground-water reservoir is replenished and the water table rises, and during other periods withdrawals exceed the available recharge and the water table declines. As changes in gage height of the water surface in a surface-water reservoir reflect changes in the amount of water stored therein or the net differences between inflow and outflow likewise, the changes in water level in wells indicate the changes in storage to the ground-water reservoir or net differences between inflow and outflow. However, because a large percentage of the volume in a ground-water reservoir consists of solids and only a small portion consists of voids, the addition or withdrawal of a given quantity of water causes fluctuation of the water table that is greater than the fluctuation of the water surface of a surface reservoir of the same volume. In the Wood River unit the ground-water reservoir is replenished by precipitation which penetrates the soil and percolates to the water table, by underflow from the valley farther west, by seepage from the Platte and Wood Rivers at times when the water surface in the rivers is higher than the adjoining water table, and by return seepage from irrigation water. Ground water is discharged from the area by underflow, well pumpage, transpiration, evaporation, and effluent seepage into streams.

If the quantity of ground water withdrawn from the area during a certain period is greater than the recharge, the water table declines. During a period of dry years the water table may decline progressively, but during a subsequent period of wet years it may rise again to its former level or it may even exceed its previous maximum high level. A decline of the water table during a dry year does not necessarily mean an excessive or dangerous withdrawal of water from the ground-water reservoir, although this condition is generally indicated when a period of decline extends over a prolonged period of years. During wet years not only is recharge increased but also withdrawals from the ground-water reservoir may be decreased as a result of decreased irrigation demands. In dry years the heavy pumping contributes to the lowering of the water table, but it increases the potential storage capacity of the ground-water reservoir; thus, in following wet years, the soil may absorb water that would have been wasted if the water table had not been low.

The increase in pump irrigation in the lower Platte River valley is beginning to affect stream flow; when the water table is lowered by pumping for irrigation, recharge from stream water is greater. This is evidenced by available stream flow data for the stretch of the Platte River, which is adjacent to the south edge of the Wood River unit. The nearest upstream river gaging station is 2.5 miles south of Odessa, which is 10 miles west of Kearney, or about 12 miles west of the western boundary of the unit and the nearest station downstream is 5 miles southeast of Grand Island at a point about 18 miles downstream from the southeast corner of the unit. Stream flow data collected at these stations show that the river may be a losing stream for periods of six months to one year. It is believed that these losses in stream flow are in part caused by contributions to the ground-water reservoir of the Wood River unit and adjacent areas which has been depleted largely because of pumping for irrigation. The graph of the cumulative difference in flow of the Platte River between the Odessa and Grand Island stations for 1946, 1947, and 1948 (see fig. 5) shows that the Platte

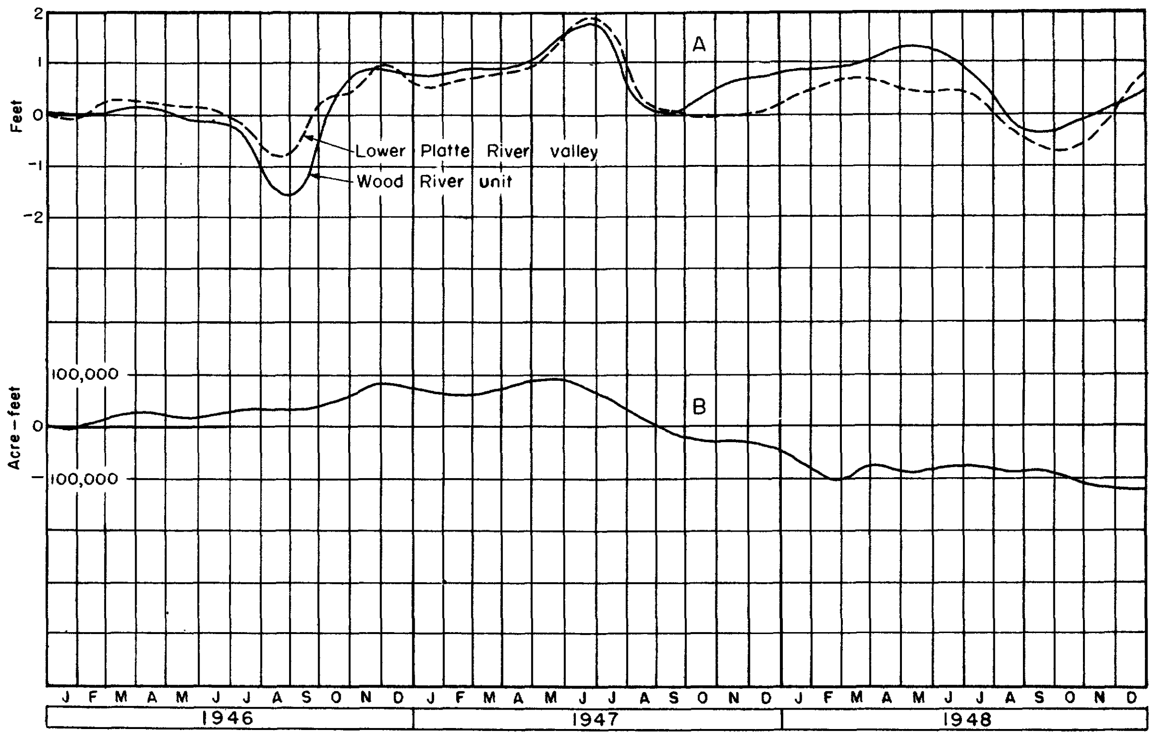

Figure 5.--A, Cumulative change in the weighted average water level in the Wood River unit and in the lower Platte River valley; B, cumulative difference in flow in the Platte River between gaging stations at Odessa and Grand Island.

River gained more than it lost from January 1946 to May 1947, but from June 1947 to the end of 1948 the river was losing more than it gained--the total loss was more than 200,000 acre-ft. Only during the periods of mid-February to May 1947 and March, May, and June of 1948 was the river a gaining stream. The cumulative changes in the weighted average water level of the Wood River unit and of the water level in the whole lower Platte River valley are also shown in figure 5. The weighted average water level in the Wood River unit fluctuates more than that of the entire lower Platte River valley. This suggests that both discharge and recharge of the ground water are more rapid and in greater magnitude in the Wood River unit than in the remainder of the valley. The large dips in the graph are due largely to the pumping of ground water for irrigation, and the rises in the graph indicate effective recharge after periods of pumping. Comparison of the two curves shows a greater cumulative rise in weighted average water levels from September 1947 to June 1948 in the Wood River unit than in the lower Platte River valley. Preceding and during this same period, the Platte River was a losing stream. This suggests that the apparent greater recharge to the ground-water reservoir in the Wood River unit may be due to influent seepage from the Platte River.

Net Changes in Ground-Water Storage

A decline in the water levels in some parts of the Wood River unit has been observed since 1930; the water table has risen slightly during some periods, but the general long-term trend has been downward. This is particularly true northwest of the town of Wood River from the River to the north edge of the valley.

Many of the irrigation wells that were inventoried in 1948 were either in existence in 1931 or have replaced wells that were in the same general locality in 1931. Hydrologic data, collected from July 1931 to July 1932 as part of an investigation of the geology and ground-water resources of south central Nebraska (Lugn and Wenzel, 1938) include depth-to-water measurements for many of these irrigation wells. Water-level measurements made in irrigation wells in 1948 were compared with those made in 1931 and 1932. These comparisons are shown for 168 wells in table 2 (pp. 50-52). The water levels in 158 of these wells showed declines of 0.01 to 9.75 ft, and the water levels in the other 10 wells showed rises of 0.08 to 1.42 ft. These 10 wells are situated in a shallow-water belt immediately adjacent to the Platte River and it is believed that the water levels in them are affected readily by recharge from the river. The greatest observed decline occurred in well 11-12-11bcc which is near the north edge of the valley about 8 miles north and 2 miles west of the town of Wood River.

The locations of the wells in which the depths to water were measured in 1931 or 1932 and again in 1948 are shown in plate 1. The numerals on the map indicate the rise (+) or decline (-) of water level between the readings. (See column 6 of table 2.) Polygons were constructed about the well locations by erecting perpendicular bisectors on the lines which connect adjacent well locations. Because all points within a given polygon are nearer to the observation well within that area than to any other observation well on the map, it is assumed that the water-level difference of that well applies to the whole polygon. The polygon method of determining the weighted average change in water levels over an area is an adaptation of the Thiessen method (Thiessen, 1911, p. 1082), which was originally used for determination of the mean depth of precipitation over a given area. The weighted average decline of the water table in the Platte River valley part of the unit was about 2.6 ft. The area of this part of the unit is approximately 215 sq mi. Therefore, if the specific yield (that is, the ratio of the volume of water which an aquifer will yield by gravity to the total volume of the aquifer) is about 20 percent, the above weighted-average decline represents a loss in ground-water storage of about 71,000 acre-ft from 1931-32 to 1948.

Changes in ground-water storage, based on fluctuations of water levels in observation wells, have been determined for monthly periods during 1946 and for bimonthly periods during 1947 and 1948. The procedure for making these determinations is that described above. This method was first applied by Ray Bentall to studies of changes in ground-water storage in the lower Platte River valley (Waite and others, 1949, p. 34). The cumulative departure in ground-water storage in the Wood River unit during 1946, 1947, and 1948, and the cumulative departure from normal precipitation at Kearney are shown graphically in figure 6. The seasonal changes in ground-water storage (fig. 6 B) show that after the lowest ground-water level is reached near the end of the pumping season each year, the amount of ground-water storage increases progressively until late the following spring. The amount of ground water in storage was reduced in July and August of each of the 3 years; the amount of depletion each year is nearly the same in magnitude, but the amount of recharge varies considerably--the recharge in the spring of 1946 was very small, primarily because the amount of precipitation was deficient. The graph also suggests that recharge from precipitation occurs with but little lag.

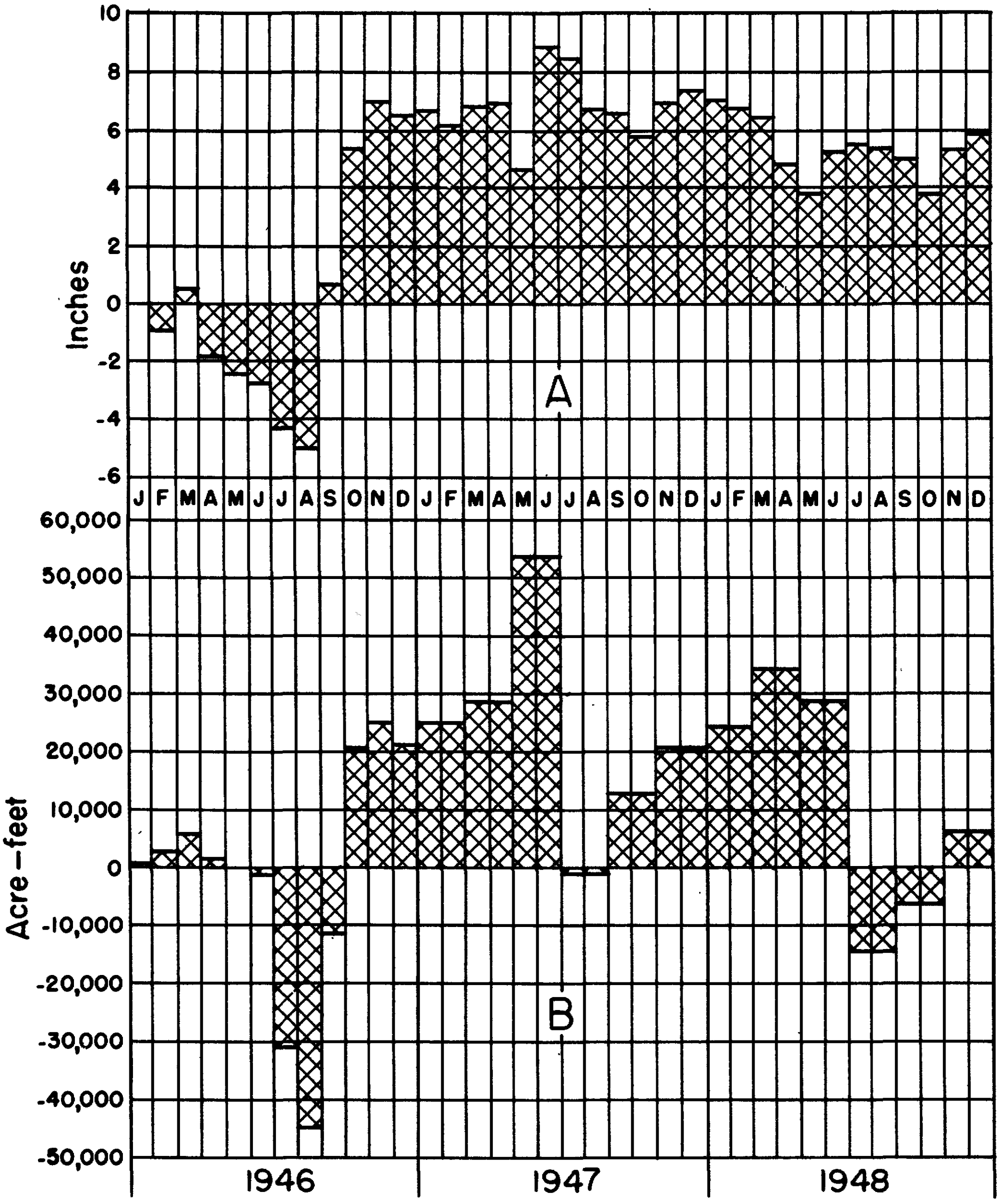

Figure 6.—A, Cumulative departure from normal monthly precipitation at Kearney; B, Cumulative change in ground-water storage in the Wood River unit.

Fluctuations Caused by Pumping

When a well is pumped, the water table surrounding the well takes the approximate form of an inverted cone. The slope of this depression is dependent among other things upon the quantity of water being pumped. As pumping continues, water flows toward the well from an increasing distance, and the cone of depression becomes progressively larger. When the pumping is stopped, the cone of depression gradually fills with water from the area beyond the limits of the cone; thus, the regional water table declines until it eventually parallels but is lower than its original surface. This process is repeated each time a well is operated and, as a result, the water table at the end of the pumping season is lower than it would have been without the pumping.

Pumping is usually started in June and is continued intermittently until late September. The amount of pumping varies considerably from year to year; it depends principally upon the distribution of summer precipitation and upon the available soil and subsoil moisture at the beginning of the growing season. The average annual fluctuation in the water table is less than 3 ft. The water levels generally are highest in June or July and are lowest at the end of the pumping season in September or October.

Fluctuations Caused by Precipitation

The soils in the Wood River unit range from heavy-textured soils on the higher terraces to light-textured soils on the lower terraces. Some of the light soils of the bottom lands were formed from sand wind blown into small dunes which produce a hummocky relief. Sandy soils cover about 24 percent of the unit.

The sandy soils are loose and are generally very porous; consequently, rain that falls on them quickly penetrates the surface and soon percolates downward to the zone of saturation. In contrast, the heavier soils of the upper terraces are relatively compact and, because infiltration is slow, much of the amount of water that reaches the zone of saturation varies considerably within relatively short distances. For this reason, the water table does not rise uniformly after a rain but takes a temporary shape of mounds and hollows. When the rain ceases, the higher water table again levels out.

Graphs, obtained from data from two wells equipped with recording gages, demonstrate the unequal recharge from precipitation. (See fig. 7.) One of the recording gages is installed on well 9-14-1dc, near Gibbon, and the other on well 11-11-25cc, which is 4 miles east of the Wood River unit. A 3- to 4-in. rain fell in the vicinity of these wells on June 22, 1947; the water table rose more than 3 ft in well 11-11-25cc, but it rose only about 6 in. in well 9-14-1dc. The water table in both wells was about the same depth below land surface before the rain: it was 16.5 ft at well 11-11-25cc and 17.5 ft at well 9-14-1dc. The differences in the character of the materials penetrated by each of the wells is shown by the following drillers' logs:

Log of well 11-11-25cc

	Feet
Loam, silt and clay	0-5
Silt, clayey	5-8
Sand, fine	8-15
Sand, fine to medium	15-20
Sand, medium to coarse	20-25
Sand, coarse	25-30
Gravel, fine	30-35
Gravel	35-37

Log of well 9-14-1dc

	Feet
Loam, black	0-2
Clay	2-10
Clay, silty, light gray	10-15
Clay, silty, black to gray	15-18
Clay, blue to gray	18-25
Sand, coarse	25-27
Gravel, coarse	27-37.5

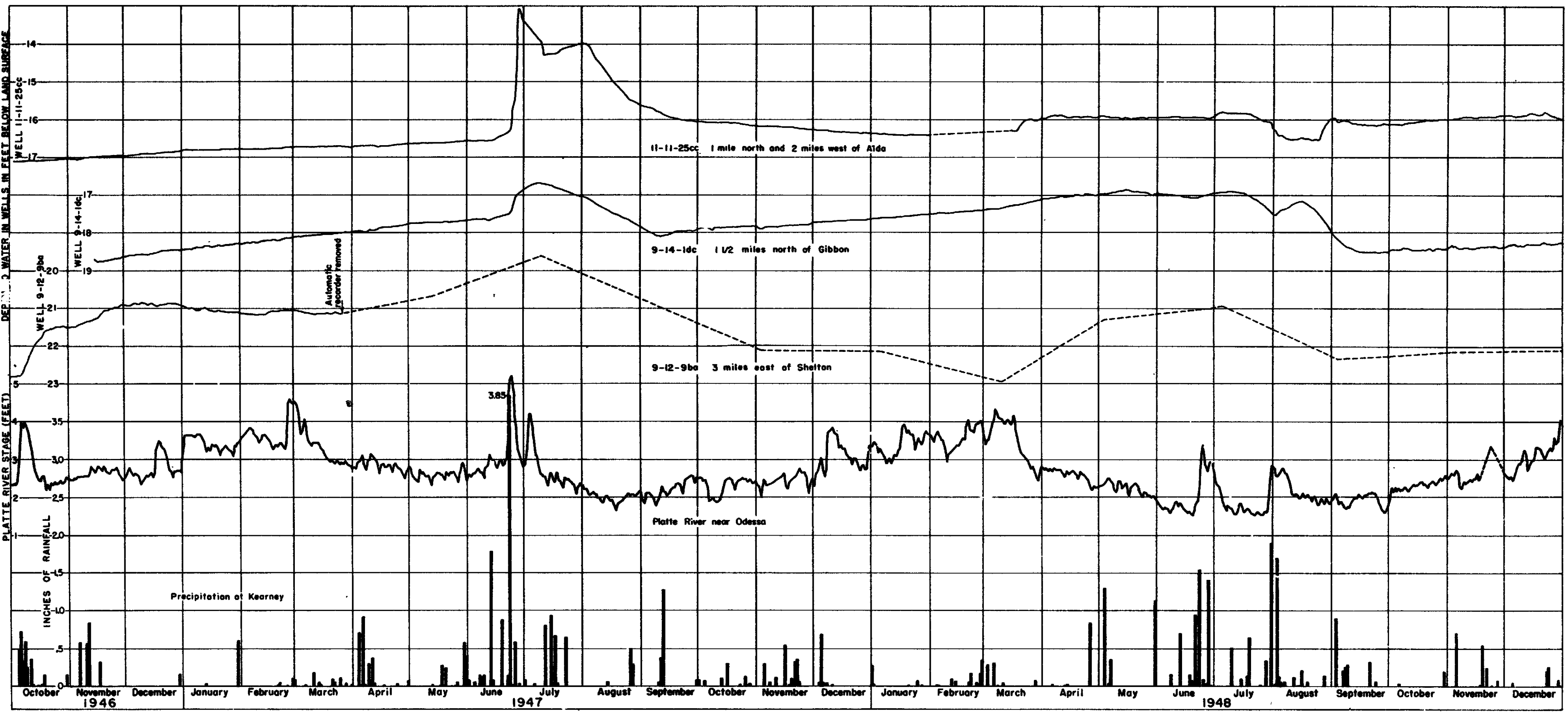

Figure 7.–Fluctuations of the water level in three wells, stage of the Platte River near Odessa, and daily precipitation at Kearney.

Fluctuations Caused by Changes in Stage of the Platte River

In the Platte River valley the fluctuations of river stage probably affect the ground-water levels at greater distances from the river than they do in most other valleys; a small rise or fall in the stage of the stream produces a change of gradient over an area extending several miles from the river, because the water table for several miles adjacent to the Platte River has essentially the same direction of flow and gradient as the river (Lugn and Wenzel, 1938, p. 119).

Whenever the Platte River rises above the water table at its banks, water percolates from the river into the ground until the adjacent water table is raised to a level approximating that of the stream. When the stage of the river is below the water table, water flows back into the stream until the water levels reach equilibrium. Consequently, when water is pumped from the ground-water reservoir for irrigation, Platte River water percolates into the ground-water reservoir.

Water-Level Measurements

The fluctuations of the water table in the Wood River unit have been recorded since 1930, when a water-level observation program for the Platte River valley was initiated by the U. S. Geological Survey in cooperation with the Conservation and Survey Division of the University of Nebraska. Water-level measurements in about 60 observation wells in the Platte River valley between Grand Island and Gothenburg were made periodically from 1930 through the summer of 1936; measurements were made at infrequent intervals from 1936 to late 1945; and since then, measurements have been made every 2 months. Twelve of these wells are in the Wood River unit. Hydrographs of the water levels in the ten wells which have the most complete records are shown in figure 8. All water-level measurements that have been made since the Missouri River basin program was initiated are shown in table 3 (pp. 53-63). Two of these wells, 9-14-1dc in Buffalo County and 9-12-9ba in Hall County, were equipped with recording gages; the lowest daily water levels for each of the two wells are given in table 3. The recorder on well 9-12-9ba was removed on March 26, 1947 at the request of the well owner who planned to install a pump on the well; periodic measurements have been continued since the recorder was

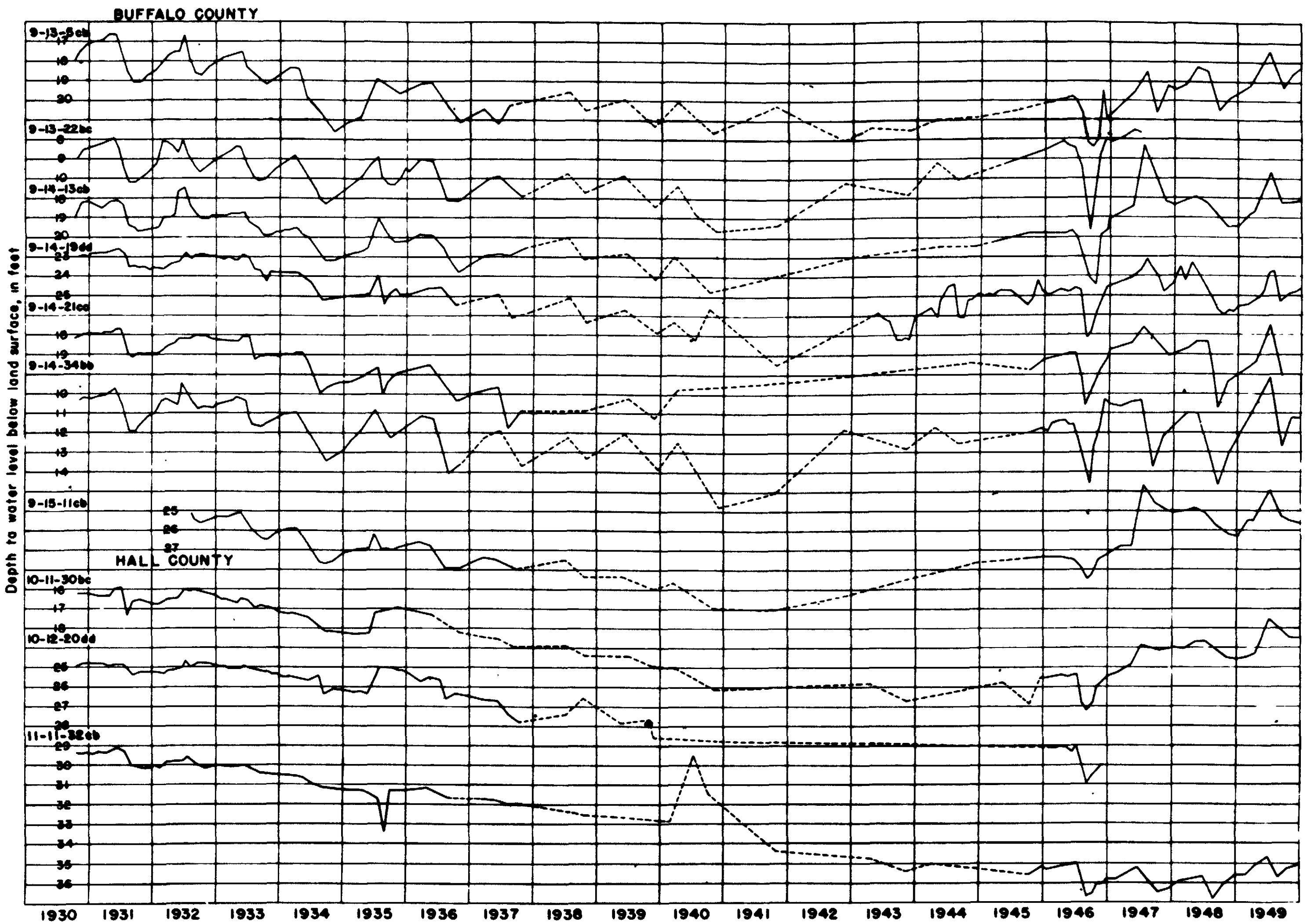

Figure 8 - Fluctuations of the water level in ten wells situated in the Wood River unit.

removed. Hydrographs of water-level fluctuations in the recorder wells for the period of October 1946 to December 1948 are shown in figure 7.

CONFIGURATION OF THE WATER TABLE

In order to ascertain the configuration of the water table, water levels were measured in a total of 50 wells within the unit and adjacent areas. The altitudes of the measuring points above mean sea level had previously been determined by spirit level at each of these wells by the Geological Survey. Water-level measurements were made in March 1948, and a water-table contour map was constructed. The water levels in 16 wells were measured again in September 1948. Contours of the water table for March and September are shown in plate 2. The altitude of the water table at each observation well is shown beside the respective well symbol plotted on the map. The altitudes for March are shown either with or without an underline, and the altitudes for September are shown below the line. Because the water table was lower in September than in March, nearly all the contour lines for September are up valley from the equivalent contour lines for March. Most of the contour lines show that the change in water-table altitudes between March and September is greatest in the area immediately adjacent to the Platte River; thus the greatest declines of the water table during the summer occurred in the lower valley benches. The areas showing the greatest declines have the most irrigation wells and most ground water pumped. In addition, large quantities of ground water are discharged in the shallow-depths-to-water areas as a result of evapotranspiration processes.

The water-table contour lines are approximately perpendicular to the general direction of the course of the Platte River. Therefore, the direction of ground-water movement is, for the most part, parallel to the river; however, the movement is slightly away from the river in some areas, particularly in the area just east of Kearney. The general movement of ground water in the Wood River unit is east to northeast; thus, the ground water is moving into the unit from the west. Wenzel (Lugn and Wenzel, p. 134) estimated that approximately 5,300,000 gal of water a day moves down the valley in the vicinity of Kearney. If this figure is correct, about 6,000 acre-ft of water a year percolates into the Wood River unit as underflow from the west. The gradient of the water table is essentially the same as the gradient of the river, that is about 7 ft to the mile. The contour lines show no appreciable movement of ground water from the uplands north of the valley but do indicate some movement of water from the Platte River into the area. The configuration of the contours suggests that precipitation within the Platte River valley is first in importance as a recharging agent, and that recharge from the Platte River during periods of high stages is, perhaps, second. During the fall of the year, when the ground-water levels are low, this factor is particularly important; a further decline in the water table would result in a greater recharge from the Platte River. Recharge from underflow from upstream regions of the valley is third in importance.

DEPTH TO THE WATER TABLE

At the time each irrigation well was inventoried, the depth to water below land surface was measured. Static water-level measurements could not be obtained in a few wells that were sealed or in wells that were being pumped at the time they were visited. Practically all wells in the area were visited during the summer and fall of 1948. The depth-to-water measurements were plotted on the irrigation well location map of the unit, and lines showing equal depths to water below land surface were drawn. (See pl. 3.) Because of the uneven surface of the land and because the measurements were made over a period of several months, these lines are only an approximate representation of the depth to water. However, the result of taking so many measurements throughout the area would tend to minimize the effect of topography and time.

A map showing the depth to water below land surface in the lower Platte River valley in March 1947 appears in an earlier report (Waite and others, 1948). The water table is nearly a plane surface which slopes with the approximate gradient of the Platte River. The surface topography of the area, however, is somewhat irregular, and ranges from flat to gently rolling; thus, the depth to water is largely governed by irregularities in the topography. In general, the depth to water becomes greater as the distance from the Platte River increases. The greatest depth to water in any of the wells inventoried in the area was 58.17 ft below land surface at well 11-12-15abb which is near the edge of the valley north-northwest of the town of Wood River. In the Platte River valley segment of the unit, the area is divided into nearly equal parts by tracks of the Union Pacific Railroad which are approximately parallel to the Platte River; between the railroad tracks and the Platte River the depth to the water table generally is less than 20 ft, and between the railroad and the north edge of the valley the depth to the water table generally is more than 20 ft. The average depth to water is between 20 and 25 ft below the land surface.

GROUND-WATER DISCHARGE

Prior to pump irrigation in the Wood River unit, the average annual discharge by natural processes was approximately equal to the average annual recharge. Ground water is discharged from the unit by plant transpiration, by evaporation, by seepage into streams, by springs, and by outflow to the east and northeast in the direction of the water-table gradient. The rate at which ground water is discharged by these processes is influenced by many factors, the most important of which are the depth to the water table, the season of the year, and, near the river, the changes in stage of the river. Differences in the depth to water beneath the area cause more ground water to be discharged in some parts of the unit than in others. More water is discharged by plant transpiration in areas adjacent to the Platte River than in other areas where the water table lies at a greater depth. Evaporation of ground water is confined to places where the water table is within a few feet of the surface or to where ground water seeps out along stream channels. Comparatively little ground water is discharged by seepage into streams in the Wood River unit; some water is discharged through springs along the Wood River, and some is discharged to the Platte River when it is at low stages. Much natural discharge of ground water takes place by underflow to the northeast. This discharge would practically equal the recharge by underflow from the west if there were no other recharge or discharge from the ground-water reservoir while the water is in transient storage beneath the unit. In the Wood River unit the inflow does not exactly balance the outflow because of the wide variation in the transmissibility of the water-bearing materials through which the water is moving and because of other complexities of the recharge-discharge relationships prevailing throughout the unit. The hydrologic properties of water-bearing materials are discussed in an earlier report on the lower Platte River valley.

The use of large amounts of ground water for irrigation has caused a progressive lowering of the water table in some areas. When the water table is lowered, the natural discharge by evaporation, by transpiration, by flow from seeps and springs, and by underground movement of water out of the unit is decreased. If the rate of decrease in the natural discharge equals the rate of withdrawal by pumping, minus the rate of recharge by percolation from irrigation, the position of the water table will become practically stationary. During the pumping season ground-water withdrawals in the pumping area north of the river could proceed to such an extent that the water table could be lowered substantially. When this happens a gradient sloping toward the pumping area is set up and ground water will move into the area of decline at an increased rate.

Discharge from Wells

Domestic and Industrial Supplies

Residents of the Wood River unit obtain most of their domestic and stock water supplies from the ground water. A few cisterns are used for the storage of rain water for laundry purposes, but water from these systems represents only a very small part of the total amount consumed. In the rural communities, most of the domestic and stock wells have a small diameter and are jetted, driven, or drilled; they are equipped with pitcher, force, rotary, or jet pumps, which are driven by hand, windmill, gas engine, or electric motor. The yields of these wells are only a few gallons a minute, and much of the pumped water returns to the ground. The total amount of water pumped for rural domestic and stock use is comparatively small and, because the area is agricultural, the use of ground water for industrial purposes is negligible.

Irrigation Supplies

The area of the Wood River unit is about 233 sq mi, or approximately 149,000 acres. According to statistics compiled by the Bureau of Reclamation (1945), water pumped from wells irrigated 53,615 acres, which is more than one-third the total area in the unit. According to the inventory made as part of this investigation, 51,055 acres were irrigated by the 1,113 wells in the Wood River unit in 1947. On the average, each section has about five wells and each well irrigates 45.9 acres. Ninety sections have six or more irrigation wells and many have nine or ten.

In 1931 and 1932 the locations of all irrigation wells in the lower Platte River valley between Chapman and Gothenburg were mapped for a cooperative ground-water survey of south central Nebraska (Lugn and Wenzel, pl. 10); about 350 irrigation wells were in the Wood River unit at that time. Thus, there was an increase of more than 760 wells from 1932 to 1948. Presumably, the number of acres irrigated during that period increased correspondingly.

Ground water is the source of nearly all irrigation water in the unit. A few pumping plants pump water directly from the Wood River, but they are relatively small installations and supply only a very small percentage of the total amount of irrigation water.

All irrigation pumping plants were visited during the summer of 1948 and the winter of 1948-49. Nearly all pump operators were interviewed at this time; a summary of the crop data thus obtained is shown in the following table.

Acreages, by township, of crops irrigated with water from wells in the Wood River unit during 1947

T.N.	R.W.	Corn	Sugar beets	Potatoes	Alfalfa	Garden truck	Miscel-laneous	Total
9	11	275	.....	....	60	......	....	335
10	11	2,631	8	....	10	......	....	2,649
9	12	3,170	165	....	....	......	55	3,390
10	12	8,372	373	240	132	......	565	9,682
11	12	1,583	13	....	....	......	50	1,646
9	13	8,654	544	122	238	5	541	10,104
10	13	4,864	227	127	40	......	10	5,268
8	14	90	.....	....	....	......	....	90
9	14	6,764	40	545	13	......	205	7,567
10	14	410	.....	....	....	......	....	410
8	15	2,541	108	40	32	12	105	2,838
9	15	6,680	122	157	55	......	62	7,076
Total		46,034	1,600	1,231	580	17	1,593	51,055

Approximately 90 percent of the irrigated acreage in 1947 was planted with corn; the remainder was planted with sugar beets, beans, potatoes, alfalfa, and small grains. Corn is the main crop in the unit because it has a high cash value and it is especially adaptable to the type of irrigation practiced in the area. A few truck gardens are irrigated; however, most of them are located in or near the towns and are watered by small pumping plants, some of which are no larger than domestic supply wells.

An estimate of the amount of water applied per irrigation acre can be readily determined from the proper data. The number of acre-feet of water that any well discharges is equal to the time the well is in operation multiplied by the discharge in acre-feet per unit time. In 1947, in 142 representative wells, the discharge averaged 856 gal a minute or $\frac{856}{5,430}$ acre-ft per hour (a discharge of a gallon a minute is equal to .000184133 or $\frac{1}{5,430}$ acre-ft per hour). The number of hours a well is in operation during the season can be calculated by the formula

$$\text{hours pumped} = \frac{\text{kilowatt hours consumed}}{\text{horsepower rating of the plant} \times 0.746}$$

The pertinent electrical energy data were obtained from the power companies, and it was computed that the 472 electrically powered wells operated for an average of 442 hr each in 1947. Therefore,

$$\text{total acre-feet} = \text{hours pumped} \times \text{discharge in acre-feet per hour,}$$

$$= 442 \times \frac{856}{5,430} = 69.7$$

the average discharge for each well in the unit was 69.7 acre-ft, and the average amount of irrigation water applied per acre in 1947 was 1.52 acre-ft ($69.7 \div 45.9 = 1.52$). A summary of these calculations for 1945, 1946, 1947, and 1948 is shown in the table on the following page.

The total annual pumpage for irrigation in the Wood River unit varies considerably, although, in general the quantity of pumped water has increased. The amount of irrigation varies somewhat with the amount and distribution of precipitation received during the growing season. Most irrigators have a tendency to consider that the precipitation during a crop season supplements the irrigation rather than to consider that the irrigation supplements the precipitation. Soon after

Average quantity of irrigation water pumped and average pumping time per acre per pump in the Wood River unit based on electric consumption data for 142 representative electrically driven pumps in 1945, 1946, 1947, and 1948

	1945	1946	1947	1948
Average hours pumped per well.............	302	445	442	363
Average acre-feet pumped per well.........	47.6	70.1	69.7	57.2
Average hours pumped per acre.............	6.58	9.69	9.63	7.91
Average acre-feet pumped per acre.........	1.04	1.53	1.52	1.25
Total acre-feet pumped in the Wood River unit[1].................................	53,000	78,000	77,600	63,700

1 Based on a total of 51,055 irrigated acres and a total of 1,113 irrigation wells.

the fields are planted, they are prepared for irrigation and are irrigated at intervals depending on the amount of precipitation received and the time since the last period of rainfall or since the last application of water.

In general, the first application of water is the largest because the loose soil is usually low in moisture content and more readily absorbs water and allows greater percolation of the water. Most irrigators do not allow the soil to become too dry because some of the crops would be damaged by drought if considerable time was required to resaturate the soil. Consequently, precipitation does not affect the amount of pumping as much as it did when irrigation was new to the area. Sometimes too much water is applied. After the pumping has begun, many of the plants operate without supervision--in fact, they often operate throughout the night. Waste occasionally results; too much water may be applied to the crop, or the banks of the irrigation ditch may collapse and allow water to flow into road ditches and other places that do not require irrigation.

Yields of Irrigation Wells

The rate of discharge of the irrigation wells in the Wood River unit varies considerably. Small driven wells, used for irrigating gardens, produce only a few gallons a minute, but some of the large wells probably yield more than 2,000 gpm. The yields were measured for

142 irrigation wells which were selected at random and were being pumped under operating conditions; the largest yield measured was 1,860 gpm.

In order to estimate accurately the pumpage of ground water in the Wood River unit, the discharges of the irrigation wells were measured under operating conditions. Most farmers in the area use siphon tubes (spiles) to divert water from the main ditches into the lateral ditches; if the pump is stopped, the siphon tubes must be reset when operation is resumed; consequently, it is necessary to select a measuring device that could be used while the plant is in operation. The factors considered in the selection of measuring equipment were: diameter, length and position of discharge pipes, range in velocity in discharge pipes, and ease and speed of operation of measuring equipment. Ordinarily there was free discharge at the outlet of the pump although the discharge of a few wells is submerged in a catchment basin. After all factors were carefully considered, it was decided that the discharge could be most satisfactorily measured with a Hoff current meter, an instrument that had been used successfully by W. E. Code (1943, p. 17) in pumping-plant investigations in Colorado. The Hoff current meter has a 4-in. rubber propeller that turns a horizontal shaft. A ring guard, which has a slightly greater diameter than the propeller, is attached near the rear of the propeller and prevents it from striking the sides of the discharge pipe. The meter, with the added guard ring, can be inserted into any discharge pipe that has a diameter greater than 4½ in. In order to obtain reasonably accurate measurements, the discharge pipe must be flowing full. Partly full pipes were sometimes made to flow completely filled by partly obstructing the opening. Rohwer (1942), irrigation engineer, Division of Irrigation, Soil Conservation Service, U. S. Department of Agriculture, describes the use of current meters in measuring pipe discharges. The meter was rated and checked for accuracy by the writer in the pump-testing laboratory of the Western Land Roller Co., Hastings, Nebr. The pump discharges that were used in rating the meter were from 6-, 8-, and 10-in. discharge pipes. A total of 55 known rates of discharge, measured continuously by a Sparling meter and a Republic flow gage, was used to calibrate the Hoff current meter.

Data collected on the measured wells are shown in table 4 (pp. 64-68). The depths to water were measured with an electrical-sounding device. Static water levels were obtained earlier in the season when the pumps were idle; at that time the static water levels may have been slightly higher than the nonpumping levels during the irrigation season. Therefore, the amount of drawdown in each case may be slightly less than the amount shown in the table.

Well Construction and Types of Irrigation Pumps

The development of more efficient pumps and irrigation practices has been accompanied by an improvement in well construction. During the early period of pump irrigation in the Wood River unit, the methods of well construction were many and frequently makeshift. Resourceful farmers often installed their own wells, particularly in areas where the water table was near the land surface. Later, local residents, after establishing themselves as professional well drillers, constructed most of the wells. Several of these drillers have expanded their businesses to include the manufacture of pumps, well casings, screens, and well-drilling equipment.

At first, some irrigation well casings were made of wood, and occasionally oil barrels were used. One of the most popular earlier types of casing, however, was galvanized iron tubing which was 24 in. in diameter; blank casing was used in fine-textured materials, such as clay or very fine sands, but otherwise the casing was perforated. Practically all of the perforated casing used is pre-perforated. At the present time very few wells are constructed using 24-in. casing.

The first type of pump in common usage was the horizontal centrifugal pump, which operates with a practical suction lift of 20 to 25 ft and which must, therefore, be either submerged or within the above limits of the source of supply. The earliest pump of this type could not be submerged; consequently, a deep pit, which had its floor a foot or two above the water table, was constructed, and the pump was placed at the bottom of the pit. The sides of the pit were generally faced with boards, masonry, or concrete. A farm tractor at the land surface was generally belted to the pump pulley in the pit. A few of these old installations are still in use.

The vertical centrifugal pump was the first pump that did not require installation in a pit. It rotated in a horizontal plane and was small enough to be installed inside of a 24-in. casing. The pump was lowered into the well to a suitable depth below the water table, and was then operated by a long vertical shaft that extended from the pump to a pulley above the ground surface--belt power was applied to the pulley. Many of these pumps are still in service.

The deep-well turbine has become the standard irrigation pump in the area. About 90 percent of the irrigation wells in the Wood River unit are now equipped with deep-well turbine pumps which have discharge pipes 4, 6, 8, or 10 in. in diameter; the 6- and 8-in. pipes are the most commonly used. The unit has 72 vertical centrifugal pumps, 28 horizontal centrifugal pumps, and more than 1,000 deep-well turbines. Most wells and pumping plants are now installed by experienced well drillers who practice the latest methods of well construction and placement of pumping equipment. An 18-in. galvanized iron casing, which is equipped with a properly designed screen, is generally installed; the well is packed with gravel around the screen and is developed after drilling. Because of these improvements, the efficiencies of modern installations are considerably greater.

Irrigation-Pump Power

Electricity, which is distributed at relatively low power rates in the Wood River unit, has been rapidly gaining popularity as a source of energy for irrigation-well pumping plants. A direct-connected vertical electric motor makes an ideal power plant for the deep-well turbine because the motor easily overcomes the low starting torque of the turbine and hence gains full speed withoug becoming overloaded. In addition, this type of installation requires little attention. However, unlike engine-powered plants which can be regulated by ohanging the engine speed, the electric motor operates at a constant speed; hence, this type of power has the disadvantage of producing a nearly constant rate of pump discharge.

Tractors are second in importance as a source of power. They are economical to operate and can be used for other purposes when they are not required for pumping. One tractor may be used to pump two or more wells, if they are pumped at different periods. Inasmuch as a natural-gas pipe line traverses the area from Kearney to Wood River, some irrigators who have wells near this line use natural gas to fuel the stationary or tractor engines which are used for operating pumps. Natural gas is purchased at the low rate of 18¢ per 1,000 cu ft; consequently, fuel costs for pumping with natural gas are relatively low, as shown in the table below.

Consumption and cost of fuel for three natural gas powered irrigation-well pumps

Well number	Kind of power unit	Gas consumption per hour (cu ft)	Cost of fuel per hour at $0.18 per 1,000 cu ft
10-12-31ccb	Stationary engine	243	$0.0437
10-12-31db	......do.........	197.8	.0355
9-13-17bbc	Tractor..........	165.6	.028

Depth and Diameter of Irrigation Wells

Most irrigation wells in the Wood River unit are comparatively shallow, as shown in the table below. Only 10 were reported to be more than 100 ft deep. Well 10-13-15ccb and well 10-13-14dbc were reported to be 242 and 225 ft deep, respectively.

Depths of 924 irrigation wells in the Wood River unit

Number of wells	Depths (feet)	Number of wells	Depths (feet)
1	20-30	30	70-80
20	30-40	5	80-90
99	40-50	5	90-100
383	50-60	10	100+
371	60-70		

The diameter of most irrigation wells is either 18 or 24 in. Most of the newer wells have 18-in. casings; this may be due to the high cost of steel and to high drilling costs. The 18-in. casing easily accommodates the deep well turbine pumps and, when used in a properly designed and developed well, it is adequate in size.

Evaporation

Evaporation of water from the Platte River and tributary streams during the summer months is a component part of the natural discharge for the Wood River unit. Wenzel (Lugn and Wenzel, p. 153) estimated that, between Chapman and Gothenburg, 15,000 acre-ft of water evaporated yearly from what was then the dry bed of the Platte River and from the adjacent lands where the water table was near the ground surface. Since the time that Wenzel made his observation, the Kingsley Dam has been constructed on the North Platte River near Keystone. Lake McConaughy, the storage reservoir created by this dam, has a capacity of about 2,000,000 acre-ft, and water is released for power and irrigation. Return flow from these and other developments maintains an almost continuous flow in the Platte River; consequently, the river bed no longer becomes completely dry for extended periods in the summer, and thus evaporation loss has greatly increased. If it is assumed that the river has an average width of 0.4 mile between Odessa and Grand Island and if it is assumed that the rate of evaporation approximates the average rate that has been computed from data from all evaporation stations in Nebraska, the total evaporation loss from this section of the Platte River would be more than 56,000 acre-ft. Because the flow in the river is so variable, the loss from surface and ground water by evaporation ranges between the above amounts; it might average about 40,000 acre-ft yearly.

The Weather Bureau and the U. S. Department of Agriculture maintain seven evaporation stations in Nebraska. These are at Bridgeport, Kingsley Dam, Lincoln, and North Platte, near Mitchell and near Rosemont, and at the Box Butte Experiment Farm near Alliance. The average evaporation for all of these stations, except Mitchell, was 48.28 in. for 1946 and 49.46 in. for 1947.

There is much opportunity for evaporation from the water surfaces of the wide Platte River and adjacent pond and marsh areas and because of this, evaporation from ground water is not nearly as great as evaporation from surface water. In areas where either the water table or the capillary fringe is near the land surface, air is readily diffused through the interstices of the soil and important evaporation losses may result. However, a dense vegetative cover soon develops in such areas, and most of the ground-water discharge is by plant transpiration.

Transpiration

Precipitation during the growing season in the Wood River unit is not generally sufficient for successful crop production, and, for this reason, supplemental irrigation is necessary, especially during the middle and late summer when there is much evaporation. Plants must have adequate water if they are to attain optimum growth. If the available soil moisture is insufficient, the roots may reach the capillary fringe or may penetrate the zone of saturation, and the plants will then obtain their water supply directly from the ground-water reservoir. In a semiarid environment a plant that takes the available water at the expense of surrounding vegetation or that best withstands periods of drought has the greatest chance for survival; in upland areas the greatest competition between plants is for water. Along the low land bordering the Platte River, the competition for water is not a limiting factor in the plant ecology because the ground water is easily accessible to the plants; as a result, there is a heavy growth of vegetation that derives most of its supplemental water from the ground-water reservoir.

About 10 percent of the land surface, or 28,500 acres, in the Wood River unit is less than 10 ft above the water table. Most plants in this area derive some supplemental water from the ground-water reservoir, and the discharge of ground water by transpiration is much greater than by evaporation. In the Platte River valley between Chapman and Gothenburg, an area which overlaps the Wood River unit both upstream and downstream, Wenzel (Lugn and Wenzel, p. 151) estimated that the amount of ground water lost by transpiration was 12 times the quantity pumped from wells in 1931-32. However, this differential would be much less now because of the increase in the number of irrigation wells; at the time of the above study 809 irrigation wells were operated in the area; by 1946, according to a survey made by the U. S. Bureau of Reclamation, the number of pumping plants had increased to about 3,275. There were about four times as many wells in 1946 as in 1932, and the amount of pumpage has probably increased proportionately. Thus, it is reasonable to assume that in 1947 the amount of water lost by transpiration was more nearly three times the quantity of water pumped from wells.

Water-loving plants, such as rushes, sedges, cattails, and reeds, form much of the vegetative growth near the river and along sloughs and old channels where the water table is near or on the surface. Willow trees grow profusely along the Platte River and cover many acres in these low areas where the soil is always moist. Occasionally they are found growing in higher places. Because willows produce great quantities of seed which are highly viable, a new dense growth of seedlings appears each summer on sand bars and along the river banks. These luxuriant growths are dependent, to a great extent, upon ground water for their water supply.

Many cottonwoods, also, grow along the river where the water table is only a few feet below the ground surface. The cottonwood, like the willow, grows best on the flood plain, but also grows in the higher, better drained areas; its deeper root system probably reaches ground water that is as much as 20 ft below land surface. Many other trees and shrubs grow along the Platte River, Wood River, and Prairie Creek in areas where the water table is shallow. These include the hackberry, ash, boxelder, black walnut, elm, buffalo berry, dogwood, elderberry, currant, wild grape, sumac, and ivy. Most of these probably obtain supplemental water from the capillary fringe.

The roots of some grasses extend 6 to 7 ft deep and obtain water from the zone of saturation. Much of the poorly drained soil of the flood plain is meadow, hayland, or pasture; grasses in these areas attain a luxuriant growth. Much of the vegetation in uncultivated, poorly drained areas consists of wild herbaceous plants which are deep rooted and obtain water from the ground-water reservoir.

Cultivated crops also obtain water from the ground-water reservoir. Corn, oats, barley, and other cereal crops have roots that penetrate the soil to a depth of 7 or 8 ft. Alfalfa, a crop that requires much water, has roots attaining depths of 20 to 30 ft. Alfalfa is grown in the Wood River unit as a soil builder in crop rotation schedules and is used for hay and for the commercial production of alfalfa meal.

By means of water-level fluctuation data, Wenzel (Lugn and Wenzel, p. 118) showed that transpiration may cause decline of the water table. An automatic recorder was installed in well 9-12-1dcc which is in the Wood River unit about 3 miles south and half a mile west of the town of Wood River, and a hydrograph was obtained for the period of June 16 to June 23, 1931. At that time, the well was surrounded by a field of corn and was 75 ft from a 40-acre field of alfalfa and 25 ft from a field of barley. The hydrograph showed that, on most days, the water level declined from 8 a.m. to 10 p.m. and then rose until 8 a.m. the next day. The total rise each day was less than the previous loss and hence the water table declined progressively. This water-level record supports the conclusion that ground water is consumed in the Wood River unit through the process of plant transpiration.

GROUND-WATER RECHARGE

Precipitation

Most of the ground-water recharge in the Wood River unit is derived from local precipitation which averages about 23 in. annually. The part of the precipitation that reaches the zone of saturation is dependent upon many factors. Some of the precipitation becomes surface-water runoff, some evaporates, some is transpired by plants, and the remainder seeps downward to the zone of saturation and recharges the ground-water reservoir. When the amount of water that is absorbed by the soil is greater than the amount that can be held by capillarity, the surplus will move downward to the zone of saturation. In the early spring the amount of water contained in the soil is usually near capacity and excess water moves downward to the zone of saturation quite readily; thus, ground-water levels usually show a general rise in the spring. However, during the growing season, much water is discharged by evaporation and transpiration and water levels decline. The soil moisture is generally largely depleted toward the end of the summer. This deficiency must be overcome before recharge to the ground water takes place in the following season.

The amount of water that is absorbed by the soil and that may then become available for recharge depends upon the character of the soil and the underlying material through which the water must pass enroute to the zone of saturation. In sandy areas where the ground is quite porous, water is readily absorbed and transmitted downward to the water table, but in loess-covered areas, particularly in the region which is northwest of the town of Wood River and which extends to the northern limit of the valley, the soil and subsoil are compact and water is absorbed very slowly. After water levels have been lowered in the summer by heavy pumpage and plant transpiration, the ground-water reservoir is recharged by precipitation until the following spring. The rate and amount of this rise is dependent on the amount and distribution of the precipitation.

Seepage from Streams

A very close relationship exists between the amount of flow in the Platte River and the amount of water in ground-water storage. Studies by Wenzel (Lugn and Wenzel, pp. 153-154, 186-187) in 1930, 1931 and 1932 proved that the Platte River is sometimes a losing stream and sometimes a gaining stream. A rise or fall in the river stage is accompanied by a rise or fall in the water levels in observation wells near the river except when the water table is affected by local rainfall. Farmers who live near the river often have observed that the water level in their wells would rise and fall with the stage of the river. The flow of the river at the Grand Island stream gaging station is often less than the flow at the upstream Odessa gaging station. (See fig. 9). Inasmuch as this loss often is in the late

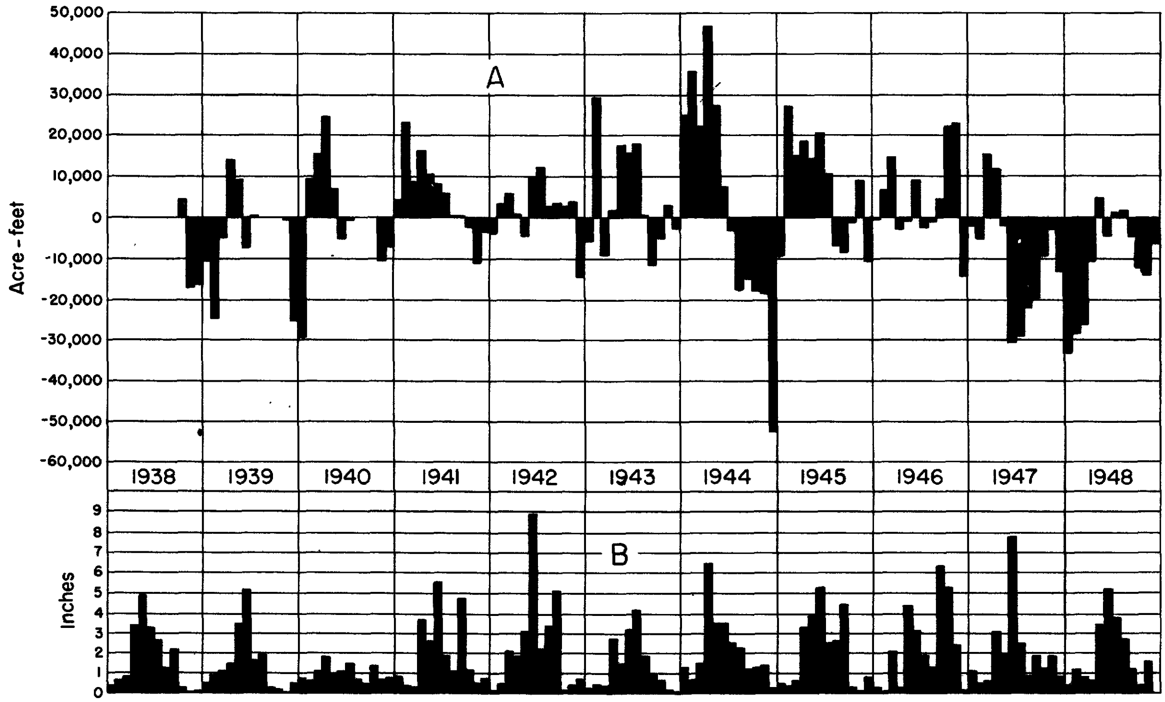

Figure 9.--A, Monthly gain or loss, in acre-feet, in the Platte River between gaging stations at Odessa and Grand Island; B, monthly rainfall, average of two stations, Grand Island and Kearney.

fall and winter months, it cannot be attributed to evapotranspiration, but to water percolating from the Platte River into the ground-water reservoir. During the period of record since the Odessa station about 10 miles west of Kearney was established in September 1938, losses in stream flow between the two stations have occurred at some time each year. The losses are not always of equal magnitude nor are they in the same months each year, but they are usually greatest during the fall and early winter. The greatest difference in flow was observed for the month of December 1944 when the total loss was more than 52,000 acre-ft. Because these losses are in the fall of the year, it is reasonable to assume that some of this water recharges the ground-water aquifer which has been depleted during the summer months as a result of evapotranspiration and of pumping for irrigation. However, during the early fall of 1946, when the precipitation was greater than for any other fall season of record, the river was a gaining stream; thus, the river was losing little or no water to ground-water storage because recharge from precipitation was sufficient. The river again became a losing stream in December when the precipitation was below normal; hence, the recharge during the period of heavy precipitation in the early fall months had not effected a complete recovery of the water table. In 1947, heavy rains occurred in the spring, the heaviest rainfall was in early June, and during the summer only slight precipitation occurred. The Platte River, which had been a gaining stream throughout the spring, began to lose water in May and remained a losing stream until the following May when the precipitation was again sufficient to recharge the ground water in the area.

Irrigation Water

Ground-water recharge also takes place by percolation from water pumped from wells that has been spread on the fields and by seepage from the ditches transporting the water to these areas. The amount of pumped water that escapes plant transpiration and evaporation and percolates downward to the zone of saturation is believed to be small. In general, water is applied to the land at times when there is a deficit in the belt of soil moisture and it is not often applied in excess of the crop requirement. The principal crops grown in the area are row crops, and therefore very little of the land is flooded by applied water. When crops are excessively watered and when irrigation water collects in depressions, some seepage to the zone of saturation may take place. As irrigation practices are improved, this condition is generally the exception and it is becoming less important each year. The high cost of fuel for power and other operating expenses in recent years has caused farmers to exercise greater care in applying the pumped irrigation water. On lands nearest the Platte River where the water table is less than 10 ft below the land surface, there is probably a higher return of water to the zone of saturation. These lands are often quite sandy and water percolates into them more readily than on the higher lands where the soils are generally fine textured and less permeable. Pump irrigation is not practiced extensively in the shallow-water areas because most crops grown in these areas can obtain supplemental water by subirrigation.

SUMMARY AND CONCLUSIONS

A total of about 77,600 acre-ft of ground water was pumped for irrigation in the Wood River unit in 1947. The average annual pumpage in this unit from 1945 to 1948, inclusive, was approximately 68,000 acre-ft. Water-level measurements made in 168 irrigation wells in 1931 and 1932 and again in the same wells in 1948 showed an average net decline in water level of about 2.6 ft. The greatest net decline, 9.75 ft, was in well 11-12-11bcc which is near the northern limit of the Platte Valley about 8½ miles north and 2 miles west of the town of Wood River.

The area of the greatest decline in the water table occurred northwest of the town of Wood River in an area which extends from the Wood River to the northern edge of the Platte River valley. Because this area lies from 6 to more than 12 miles from the Platte River, the immediate and effective recharge from the river is small. Removal of large quantities of ground water by pumping must necessarily be accompanied by a lowering of the water table in the area involved unless surface water is introduced concurrently with ground-water removal. Thus, the fact that water levels have declined in this part of the Wood River unit from 1931 to 1949 does not necessarily imply that there has been an overdraft on the ground-water reservoir. As the area of the lowered water table increases, the hydraulic gradients from surrounding areas increase and the amount of ground-water inflow into the area increases. After pumping is discontinued at the end of the pumping season, ground water from outside areas continues to recharge the area of lowered water table at a diminishing rate as the depression fills with water. If pumping is resumed before the water table has recovered completely, the water levels in wells in the depression area would be lowered further. A large part of the net decline in water levels in wells in this part of the Wood River unit from 1931 to 1949 probably resulted from only partial recovery of the water table after the years of subnormal precipitation and heavy pumping.

Hydrographs of ground-water fluctuations from 1931 to 1949 in wells in the area of declining water levels indicate that from 1941 to 1949 when precipitation has been normal or above, the water levels in wells have either remained relatively constant or have shown an upward trend. Therefore, under the present conditions, the recharge of ground water is slightly greater than the discharge. However, in the future, there may again be periods of subnormal precipitation; as a result, the natural recharge will decrease, discharge owing to pumping for irrigation will increase, and the water table will again decline.

Drought of several years' duration might result in a serious overdraft of the ground-water resources in parts of the Wood River unit. The importation of surface water to this area would supplement the natural recharge to the ground-water reservoir and tend to even out the major fluctuations in ground-water levels. Adequate water-level observation data would be necessary for the efficient operation of such a program.

Special attention must be given to areas where it is probable that the application of surface water will result in high water-table conditions. In such areas, it is recommended that a large number of observation wells be installed in a grid system pattern so designed as to give maximum ground-water information in the areas and that adequate provision be made for the collection of water-level records and for their analysis by qualified professional persons.

REFERENCES

Code, W. E., 1943, Use of ground water for irrigation in the South valley of Colorado: Colorado Agr. Exper. Sta. Bull. 483, p. 17.

Condra, G. E., 1930, The conservation of Nebraska's water resources: Nebraska Univ. Cons. Dept. Bull. 3, 19 pp.

Condra, G. E., 1934, The relation of drought to water use in Nebraska: Nebraska Univ. Cons. Dept. Bull. 6, 24 pp.

Condra, G. E., and Reed, E. C., 1936, Water-bearing formations of Nebraska: Nebraska Geol. Survey Paper 10, 24 pp.

Condra, G. E., Reed, E. C., and Gordon, E. D., 1950, Correlation of the Pleistocene deposits of Nebraska: Nebraska Geol. Survey Bull. 15A.

Darton, N. H., 1898, Underground waters of a portion of southeastern Nebraska: U. S. Geol. Survey Water-Supply Paper 12, 56 pp.

Hayes, F. A., Huddleston, A. N., and Layton, M. H., 1928, Soil survey of Buffalo County, Nebr.: U. S. Dept. Agr., Bur. Chemistry and Soils, no. 12, 1924 ser., 56 pp.

Lugn, A. L., and Wenzel, L. K., 1938, Geology and ground-water resources of south central Nebraska, with special reference to the Platte River valley between Chapman and Gothenburg: U. S. Geol. Survey Water-Supply Paper 779, 242 pp.

Meinzer, O. E., 1923, The occurrence of ground water in the United States, with discussion of principles; U. S. Geol. Survey Water-Supply Paper 489, 321 pp.

Meinzer, O. E., 1927, Plants as indicators of ground water: U. S. Geol. Survey Water-Supply Paper 577, 95 pp.

Meinzer, O. E., 1932, Outline of methods for estimating ground-water supplies: U. S. Geol. Survey Water-Supply Paper 638-C, pp. 99-144.

Rohwer, Carl, 1942, The use of current meters in measuring pipe discharges: Colorado Agr. Exper. Sta. Tech. Bull. 29, pp. 1-40.

Schultz, C. B., and Stout, T. M., Pleistocene deposits of Nebraska: Am. Jour. Sci., May, 1945.

Thiessen, A. H., 1911, Precipitation averages for large areas: Monthly Weather Rev., July, p. 1082.

Veatch, J. O. and Seabury, V. H., 1918, Soil survey of Hall County, Nebr.: U. S. Dept. Agr., Bur. of Soils, Field Operations for 1916, 41 pp.

Wenzel, L. K., 1937, The Thiem method for determining of water-bearing materials and its application to the determination of specific yield, results of investigations in the Platte River valley, Nebr.: U. S. Geol. Survey Water-Supply Paper 679, pp. 1-57.

Wenzel, L. K., 1940, Local overdevelopment of ground-water supplies, with special reference to conditions at Grand Island, Nebr.: U. S. Geol. Survey Water-Supply Paper 836-E, pp. 233-281.

Wenzel, L. K., 1942, Methods for determining permeability of water-bearing materials with special reference to discharging well methods: U. S. Geol. Survey Water-Supply Paper 887, 192 pp., 6 pls.

Waite, H. A., and others, 1949, Progress report on the geology and ground-water hydrology of the Lower Platte River valley, Nebr., with a section on the chemical quality of the ground water by H. A. Swenson: U. S. Geol. Survey Circ. 20, 211 pp., 9 pls.

Table 2.--Net water-level rise (+) or decline (-) for the period 1931-1932 to 1948

Well number	Date of measurement	Water level below land-surface datum (feet)	Date of measurement	Water level below land-surface datum (feet)	Difference in water level (feet)
8-15-2abb	June 8, 1932	11.28	Aug. 10, 1948	14.44	-3.16
-3bbb	16	11.61	3	16.08	-4.47
-3cbb	16	12.69	July 29	16.62	-3.93
-4aab	15	13.46	Aug. 4	17.05	-3.59
-4acb	15	12.88	12	17.67	-4.79
-4bbc	15	16.11	July 29	19.53	-3.42
-4ccc	16	10.09	29	12.95	-2.86
-6aad	22	16.76	29	21.59	-4.83
-6adc	18	18.23	27	22.86	-4.63
-6dcc	22	10.23	29	14.08	-3.85
-8baa	18	10.21	29	13.00	-2.79
-9cbc	17	5.81	29	8.32	-2.51
8-16-12cc	July 4	6.30	July 6	5.12	+1.18
9-11-7cbc	Oct. 30, 1931	9.37	June 17	9.51	-.14
9-12-1bcd	30	16.98	18	18.15	-1.17
-1cc	Aug. 8	5.67	18	5.90	-.23
-1dcc	8	6.00	18	5.90	+.10
-4acb	Oct. 30	17.48	July 1	20.30	-2.82
-4bdb	Aug. 10	17.14	15	18.50	-1.36
-8ad	12	14.15	1	14.54	-.39
-9ba	13	20.51	June 30	21.20	-.69
-13abb	8	9.04	21	7.62	+1.42
9-13-1abc	Oct. 30	16.34	Sept.30	18.80	-2.46
-2ddb	Aug. 17	13.53	July 8	15.07	-1.54
-4bbb	26	15.00	Sept.28	17.88	-2.88
-5aca	27	15.33	Oct. 5	17.15	-1.82
-5bda	27	15.51	5	17.23	-1.72
-5cb	27	18.99	Sept. 3	20.52	-1.53
-6bbb	27	22.64	Aug. 19	24.97	-2.33
-7dcb	28	20.96	Oct. 7	22.13	-1.17
-8aca	29	15.04	7	16.45	-1.41
-8cca	28	17.21	1	19.81	-2.60
-8dbb	29	15.93	1	18.02	-2.09
-9ccd	18	12.73	Sept. 3	15.10	-2.33
-11cd	15	17.54	July 9	17.83	-.29
-12ab	14	18.67	6	19.40	-.73
-12cb	Oct. 30	14.94	7	15.18	-.24
-14aa	Aug. 17	15.81	7	15.82	-.01
-14acc	15	16.16	Oct. 28	16.64	-.48
-16db	18	14.63	Sept.29	16.15	-1.52
-17abc	19	15.00	29	17.69	-2.69
-18ddb	20	16.23	Aug. 9	16.67	-.44
-19bbb	20	10.23	9	10.61	-.38
-20dca	21	8.90	Sept.30	9.48	-.58
-21aab	18	15.90	29	16.30	-.40
-21acb	19	13.95	30	15.02	-1.07
-21bc	21	14.29	30	15.66	-1.37
-21cb	22	11.68	30	11.33	+.35
-22bcc	Sept.15	10.44	Oct. 13	12.14	-1.70
-26aca	Aug. 15	6.96	12	7.65	-.69
-29ab	22	7.65	15	6.76	+.89
-29bc	19	6.18	15	4.98	+1.20
-30cb	22	5.25	14	5.56	-.31
-30ddc	21	5.20	15	4.60	+.60
-33ba	21	5.70	Nov. 3	5.62	+.08
9-14-1bbb	May 18, 1932	28.67	July 27	32.64	-3.97
-2aaa	18	28.88	27	33.20	-4.32
-2bba	19	25.49	29	29.46	-3.97
-2ddd	19	21.58	29	23.47	-1.89

Table 2.--Net water-level rise (+) or decline (-) for the period 1931-1932 to 1948--Continued

Well number	Date of measurement	Water level below land-surface datum (feet)	Date of measurement	Water level below land-surface datum (feet)	Difference in water level (feet)
9-14-10ccb	May 19, 1932	19.53	July 30, 1948	22.99	-3.46
-10ddc	19	23.99	30	26.17	-2.18
-11bcb	19	20.38	29	22.37	-1.99
-11ccb	19	22.98	29	26.04	-3.06
-13cb	Feb. 3	18.97	Mar. 9	18.17	+.80
-15ccc	May 21	24.98	Aug. 3	26.17	-1.19
-16dad	20	24.79	3	28.23	-3.44
-19cbb	26	24.12	2	26.80	-2.68
-19ddb	Feb. 3	23.48	July 28	25.17	-1.69
-21ccb	Aug. 8	18.01	Aug. 8	19.78	-1.77
-22cbb	May 14	11.50	3	13.06	-1.56
-26adb	12	10.86	13	13.02	-2.16
-26cbb	13	11.33	11	12.56	-1.23
-27acb	14	9.96	11	11.58	-1.62
-27bbc	25	12.44	4	14.69	-2.25
-27cbb	26	11.93	3	13.87	-1.94
-27ccb	25	11.22	4	12.80	-1.58
-27dcb	13	10.45	11	12.15	-1.70
-28abc	21	12.46	11	14.73	-2.27
-28bac	21	12.47	11	14.81	-2.34
-28bbc	14	13.63	6	15.73	-2.10
-28cbb	14	12.02	6	14.65	-2.63
-28dcc	14	10.96	10	14.21	-3.25
-31dbc	27	14.18	Sept. 2	17.90	-3.72
-32bbb	25	12.58	Aug. 9	15.09	-2.51
-32cbb	25	12.68	9	13.41	-.73
-33bbc	20	11.40	6	14.05	-2.65
-34bb	Feb. 3	10.87	Mar. 9	11.05	-.18
9-15-11cb	June 11	24.61	July 5	25.10	-.49
-12dac	May 26	23.49	Nov. 17	25.16	-1.67
-14aac	June 10	22.85	12	26.64	-3.79
-14dad	10	24.48	12	26.80	-2.32
-15dcc	10	25.93	Aug. 14	30.05	-4.12
-24dca	3	28.69	Nov. 16	30.63	-1.94
-25caa	8	18.61	Dec. 2	22.83	-4.22
-25ccc	4	17.76	Aug. 14	20.66	-2.90
-26dbd	4	28.61	14	28.68	-.07
-27ddc	9	18.01	Dec. 2	22.01	-4.00
-31abb	24	31.79	Mar. 16	34.47	-2.68
-33ac	16	17.24	Dec. 9	22.11	-4.87
-33dbc	16	17.14	9	21.86	-4.72
-34abc	9	16.71	20	21.03	-4.32
-34dab	9	14.80	9	18.09	-3.29
-34dbb	9	15.04	Aug. 4	16.12	-1.08
-35aac	8	18.40	Dec. 16	22.15	-3.75
-35dcc	8	11.51	16	15.38	-3.87
-36cbb	4	17.03	Aug. 4	19.97	-2.94
10-11-6bac	July 17, 1931	28.88	June 14	35.48	-6.60
-6ccc	Oct. 29	22.74	14	29.16	-6.42
-7bbc	Aug. 3	26.63	11	31.66	-5.03
-17cba	Nov. 5	18.94	11	22.29	-3.35
-20bcc	Oct. 31	15.13	9	16.30	-1.17
-20dcb	Nov. 6	17.37	10	19.04	-1.67
-30bc	2	16.38	15	18.87	-2.49
10-12-1ccc	July 17	25.20	14	31.07	-5.87
-2acb	16	27.89	16	34.52	-6.63
-4ac	16	23.57	25	28.50	-4.93
-4adb	16	24.35	25	29.05	-4.70
-5acc2	Nov. 7	26.86	Sept. 3	32.10	-5.24

Table 2.--Net water-level rise (+) or decline (-) for the period 1931-1932 to 1948--Continued

Well number	Date of measurement	Water level below land-surface datum (feet)	Date of measurement	Water level below land-surface datum (feet)	Difference in water level (feet)
10-12-9dcc	Oct. 29, 1931	23.27	July 19, 1948	28.79	-5.52
-10bbb	July 17	22.84	16	28.76	-5.92
-10ccc	Oct. 29	24.55	June 16	30.20	-5.65
-11ddc	Nov. 5	29.28	17	34.55	-5.27
-12acc	5	24.71	15	30.42	-5.71
-12cbd	5	26.60	15	32.08	-5.48
-13acb	5	19.01	24	23.09	-4.08
-15acc	5	27.72	July 20	32.79	-5.07
-15bc	July 18	26.85	6	32.27	-5.42
-16acc	18	26.27	20	32.60	-6.33
-16dcb	Dec. 7	26.87	13	32.61	-5.74
-17acc	July 18	21.89	14	27.80	-5.91
-17ccc	Oct. 29	25.38	9	29.58	-4.20
-20ccc	Nov. 5	25.11	June 22	30.13	-5.02
-21ccb	5	23.00	22	27.42	-4.42
-22dbc	5	18.57	29	21.70	-3.13
-23bca	5	20.13	18	23.20	-3.07
-24dab	Aug. 10	15.75	July 7	18.38	-2.63
-25abc	Oct. 30	14.54	7	16.26	-1.72
-25dbc	30	14.21	7	16.16	-1.95
-27aab	Aug. 10	20.12	June 25	23.69	-3.57
-27bbb	4	20.31	21	24.73	-4.42
-29aac	10	24.07	July 16	28.20	-4.13
-30aba	Nov. 5	23.34	14	28.74	-5.40
-30cba	7	26.22	21	31.08	-4.86
-30cbb	7	19.40	June 22	23.43	-4.03
-30dca	Aug. 11	19.67	July 13	23.22	-3.55
-31abd	11	19.33	14	22.81	-3.48
-31acc	Nov. 7	18.22	16	21.31	-3.09
10-13-14ddd	7	19.71	15	24.47	-4.76
-24bcc	Aug. 24	20.01	13	24.11	-4.10
-25ccc	24	20.58	7	23.62	-3.04
-25dbc	24	22.00	June 24	25.82	-3.84
-38bbc	26	28.30	July 19	27.88	+.42
-31ccb	26	23.93	23	26.19	-2.26
-31ccb	26	22.08	23	24.01	-1.93
-32dbb	26	18.47	22	20.89	-2.42
-32cbb	26	18.65	20	19.98	-1.33
-33ccb	26	16.67	20	18.35	-1.68
-34dab	21	15.56	7	16.90	-1.34
-34db	26	17.04	8	18.55	-1.51
-35cca	25	15.88	8	17.54	-1.66
-36acc	Nov. 7	18.95	June 29	20.28	-1.33
11-11-32cb	July 7	29.30	July 5	35.60	-6.30
11-12-11bcc	2	38.48	June 18	48.23	-9.75
-27bbb1	10	30.40	23	36.62	-6.22
-34bca	Nov. 7	24.51	23	28.66	-4.15
-35acc	July 15	25.59	24	32.91	-7.32
-35dbb	Oct. 29	27.17	24	32.44	-5.27
-36bc	29	25.45	24	30.90	-5.45

Table 3.--Water-level measurements in wells, in feet below land-surface datum

Buffalo County

9-13-5cb.

Date	Water level	Date	Water level	Date	Water level
Oct. 18, 1945	20.34	Oct. 4, 1946	22.02	May 3, 1948	18.39
Dec. 12	20.16	Nov. 7	19.42	July 5	18.47
Jan. 17, 1946	20.10	Dec. 2	20.90	Sept. 3	20.52
Feb. 13	20.02	Jan. 6, 1947	20.58	Nov. 3	19.90
Mar. 13	19.95	Mar. 10	20.12	Jan. 6, 1949	19.55
Apr. 10	19.85	May 12	19.59	Mar. 9	19.23
May 8	19.76	July 10	18.10	Apr. 12	18.79
June 7	19.99	Sept. 5	20.75	July 5	17.40
July 10	20.62	Nov. 3	19.35	Sept. 7	19.24
Aug. 7	22.22	Jan. 5, 1948	19.44	Nov. 1	18.57
Sept. 5	22.54	Mar. 9	19.19		

9-13-9cc.

Oct. 19, 1945	14.57	Nov. 7, 1946	14.66	July 5, 1948	12.45
Dec. 12	14.00	Dec. 2	14.22	Sept. 3	15.10
Jan. 17, 1946	13.93	Jan. 6, 1947	13.60	Oct. 8	14.38
Feb. 13	13.79	Mar. 10	13.19	Nov. 3	14.07
Mar. 13	13.72	May 12	12.80	Jan. 6, 1949	15.77
Apr. 10	13.60	July 10	13.00	Mar. 9	13.32
May 8	13.60	Nov. 3	12.44	Apr. 13	13.02
June 7	13.60	Jan. 5, 1948	13.05	July 5	10.87
July 10	13.91	Mar. 10	12.85	Sept. 6	12.68
Oct. 4	17.09	May 3	12.39	Nov. 1	12.35

9-13-22bc.

Oct. 18, 1945	8.69	June 7, 1946	8.38	Dec. 2, 1946	7.87
Dec. 12	8.57	July 10	9.22	Jan. 6, 1947	8.05
Jan. 17, 1946	8.39	Aug. 7	10.97	Mar. 10	7.81
Feb. 13	8.21	Sept. 5	12.74	May 12	7.49
Mar. 13	8.17	Oct. 4	11.47	July 10	7.68
Apr. 10	8.03	Nov. 7	8.49	Well destroyed	
May 8	8.27				

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-14-1dc. Measurements made after Nov. 14, 1946, are lowest daily water level as taken from recorder charts

1946

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.65
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.64
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.61
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.49	.....	18.61
5	.....	.....	.....	.....	.....	.....	.....	.....	19.79	.....	.....	18.60
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.59
7	.....	.....	.....	.....	.....	.....	.....	19.32	.....	.....	18.89	18.58
8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.57
9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.57
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.57
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.56
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.55
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.55
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.73	18.55
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.77	18.54
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.79	18.54
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.79	18.55
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.77	18.55
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.76	18.52
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.75	18.50
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.74	18.50
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.74	18.50
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.72	18.49
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.70	18.49
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.70	18.49
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.69	18.47
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.68	18.47
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.67	18.48
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.66	18.48
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.65	18.48
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.48

1947

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.45	18.29	18.13	17.97	17.79	17.70	16.87	17.04	17.88	17.90	17.86	17.73
2	18.45	18.30	18.13	17.96	17.79	17.72	16.83	17.06	17.92	17.89	17.85	17.77
3	18.45	18.27	18.12	17.95	17.77	17.70	16.78	17.08	17.92	17.89	17.82	17.77
4	18.45	18.28	18.12	17.93	17.77	17.68	16.75	17.07	17.96	17.89	17.82	17.75
5	18.43	18.28	18.13	17.95	17.77	17.69	16.73	17.10	17.98	17.89	17.83	17.75
6	18.42	18.26	18.13	17.98	17.77	17.69	16.72	17.12	18.00	17.89	17.81	17.73
7	18.42	18.26	18.12	18.00	17.77	17.68	16.69	17.16	18.01	17.90	17.81	17.74
8	18.43	18.26	18.11	17.97	17.76	17.68	16.68	17.17	18.03	17.92	17.82	17.76
9	18.43	18.25	18.10	17.94	17.76	17.65	16.67	17.20	18.05	17.88	17.82	17.75
10	18.30	18.25	18.10	17.92	17.74	17.68	16.67	17.23	18.07	17.88	17.82	17.74
11	18.37	18.26	18.08	17.94	17.74	17.71	16.68	17.27	18.10	17.86	17.81	17.73
12	18.36	18.26	18.06	17.95	17.75	17.71	16.72	17.30	18.10	17.90	17.83	17.74
13	18.35	18.24	18.06	17.94	17.77	17.67	16.73	17.35	18.04	17.90	17.82	17.73
14	18.37	18.24	18.06	17.90	17.75	17.65	16.78	17.38	18.04	17.88	17.79	17.70
15	18.38	18.25	18.06	17.88	17.76	17.64	16.79	17.42	18.04	17.86	17.80	17.71
16	18.39	18.23	18.06	17.88	17.76	17.63	16.82	17.46	18.00	17.86	17.83	17.72
17	18.38	18.22	18.06	17.87	17.75	17.61	16.86	17.49	17.99	17.86	17.83	17.71
18	18.37	18.22	18.05	17.85	17.75	17.60	16.89	17.53	17.98	17.87	17.80	17.70
19	18.35	18.20	18.05	17.86	17.75	17.60	16.88	17.55	17.98	17.88	17.80	17.71
20	18.37	18.20	18.03	17.86	17.75	17.58	16.92	17.58	17.97	17.86	17.79	17.73
21	18.38	18.20	18.02	17.85	17.73	17.55	16.93	17.61	17.97	17.85	17.81	17.70
22	18.36	18.19	18.00	17.84	17.75	17.55	16.94	17.63	17.98	17.84	17.82	17.70
23	18.33	18.19	18.01	17.84	17.75	17.35	16.96	17.67	17.94	17.86	17.80	17.71
24	18.32	18.18	18.02	17.84	17.75	17.15	16.98	17.70	17.94	17.87	17.78	17.70
25	18.31	18.18	18.03	17.84	17.72	17.06	17.00	17.74	17.94	17.87	17.79	17.71
26	18.31	18.18	18.02	17.83	17.72	17.03	17.00	17.77	17.94	17.85	17.78	17.67
27	18.30	18.17	18.00	17.81	17.71	16.97	17.01	17.80	17.93	17.84	17.79	17.65
28	18.30	18.14	17.99	17.81	17.71	16.94	17.03	17.82	17.93	17.84	17.78	17.65
29	18.28	.....	18.00	17.79	17.72	16.92	17.03	17.84	17.94	17.84	17.80	17.65
30	18.28	.....	17.99	17.78	17.71	16.89	17.04	17.84	17.94	17.82	17.80	17.66
31	18.28	.....	17.97	.....	17.69	.....	17.04	17.87	.....	17.85	.....	17.66

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-14-1dc--Continued.

1948

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	17.64	17.50	17.47	17.12	16.93	16.95	16.95	17.53	18.08	18.47	18.41	18.38
2	17.63	17.50	17.43	17.14	16.94	16.99	16.93	17.50	18.16	18.45	18.30	18.35
3	17.67	17.50	17.39	17.13	16.95	16.95	16.91	17.50	18.25	18.45	18.38	18.35
4	17.68	17.47	17.42	17.08	16.90	16.95	16.90	17.37	18.27	18.45	18.36	18.34
5	17.65	17.49	17.43	17.08	16.89	16.98	16.90	17.37	18.30	18.46	18.40	18.32
6	17.65	17.50	17.42	17.08	16.93	17.01	16.88	17.29	18.32	18.47	18.43	18.34
7	17.59	17.48	17.39	17.06	16.89	16.99	16.87	17.23	18.35	18.46	18.43	18.35
8	17.62	17.52	17.36	17.10	16.87	17.01	16.87	17.20	18.37	18.44	18.43	18.35
9	17.63	17.52	17.35	17.11	16.87	17.03	16.87	17.18	18.40	18.40	18.41	18.34
10	17.63	17.46	17.37	17.07	16.91	17.00	16.89	17.17	18.40	18.40	18.39	18.37
11	17.57	17.48	17.37	17.00	16.94	17.03	16.88	17.16	18.42	18.45	18.41	18.37
12	17.60	17.49	17.34	17.03	16.95	17.00	16.89	17.16	18.42	18.45	18.40	18.30
13	17.60	17.47	17.34	17.06	16.93	17.00	16.89	17.15	18.43	18.46	18.40	18.32
14	17.60	17.46	17.32	(a)	16.88	17.05	16.92	17.15	18.45	18.46	18.40	18.31
15	17.59	17.48	17.32	(a)	16.85	17.05	16.92	17.14	18.48	18.45	18.40	18.32
16	17.60	17.44	17.35	17.05	16.88	17.02	16.95	17.17	18.47	18.46	18.40	18.31
17	17.59	17.45	17.34	17.05	16.89	17.02	16.97	17.23	18.47	18.46	18.39	18.32
18	17.56	17.46	17.29	16.97	16.88	17.07	17.03	17.25	18.47	18.45	18.38	18.33
19	17.58	17.43	17.28	17.01	16.88	17.03	17.01	17.24	18.47	18.46	18.38	18.33
20	17.53	17.49	17.28	17.03	16.89	17.03	17.01	17.27	18.47	18.45	18.37	18.30
21	17.53	17.49	17.27	17.03	16.87	17.07	17.01	17.31	18.47	18.41	18.39	18.29
22	17.55	17.48	17.27	16.97	16.87	17.05	17.03	17.34	18.47	18.45	18.39	18.29
23	17.57	17.46	17.23	16.95	16.89	17.02	17.11	17.38	18.47	18.48	18.36	18.31
24	17.53	17.42	17.22	16.95	16.92	17.01	17.23	17.49	18.46	18.45	18.36	18.32
25	17.55	17.46	17.20	16.96	16.94	17.05	17.27	17.53	18.46	18.43	18.35	18.31
26	17.55	17.45	17.16	16.99	16.95	17.04	17.30	17.58	18.46	18.43	18.36	18.30
27	17.56	17.42	17.22	17.01	16.97	17.01	17.36	17.64	18.46	18.43	18.40	18.33
28	17.55	17.39	17.22	17.02	16.96	16.99	17.40	17.73	18.48	18.44	18.41	18.32
29	17.49	17.46	17.14	16.98	16.95	16.97	17.43	17.84	18.48	18.44	18.38	18.28
30	17.49	.....	17.13	16.92	16.95	16.96	17.43	17.94	18.47	18.45	18.39	18.25
31	17.51	.....	17.12	.....	16.96	.....	17.50	18.01	.....	18.43	.....	18.32

1949

Day	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	18.31	18.15	17.85	17.65	17.32	17.02	15.77	16.31	17.61	17.38	17.34	17.26
2	18.30	18.15	17.87	17.65	17.29	17.01	15.75	16.41	17.64	17.38	17.34	17.24
3	18.29	18.12	17.87	17.65	17.28	16.91	15.73	16.50	17.67	17.40	17.32	17.22
4	18.23	18.11	17.87	17.60	17.32	16.86	15.71	16.58	17.69	17.38	17.33	17.26
5	18.24	18.11	17.87	17.60	17.32	16.82	15.69	16.67	17.70	17.35	17.34	17.26
6	18.22	18.10	17.85	17.59	17.29	16.78	15.68	16.76	17.73	17.35	17.33	17.20
7	18.20	18.11	17.82	17.58	17.27	16.74	15.68	16.82	17.72	17.40	17.30	17.23
8	18.22	18.09	17.81	17.57	17.28	16.66	15.69	16.89	17.70	17.40	17.28	17.24
9	18.25	18.12	17.78	17.57	17.27	16.45	15.70	16.97	17.65	17.38	17.26	17.24
10	18.25	18.14	17.76	17.56	17.26	16.22	15.69	17.03	17.60	17.41	17.26	17.18
11	18.24	18.14	17.76	17.54	17.26	16.15	15.68	17.08	17.60	17.42	17.26	17.14
12	18.22	18.10	17.75	17.53	17.25	16.16	15.67	17.13	17.60	17.41	17.29	17.24
13	18.18	18.11	17.75	17.51	17.24	16.08	15.66	17.17	17.57	17.43	17.29	17.24
14	18.17	18.12	17.75	17.53	17.23	16.07	15.64	17.18	17.54	17.42	17.29	17.25
15	18.16	18.11	17.76	17.53	17.22	16.02	15.63	17.20	17.50	17.38	17.27	17.25
16	18.23	18.08	17.74	17.47	17.21	15.99	15.62	17.23	17.50	17.35	17.29	17.23
17	18.22	18.11	17.73	17.46	17.21	16.01	15.60	17.22	17.50	17.35	17.28	17.18
18	18.17	18.10	17.73	17.45	17.22	16.00	15.59	17.19	17.50	17.33	17.28	17.14
19	18.20	18.08	17.72	17.44	17.18	15.95	15.57	17.20	17.48	17.34	17.25	17.16
20	18.20	18.09	17.70	17.40	17.15	15.96	15.56	17.19	17.48	17.34	17.28	17.17
21	18.16	18.10	17.69	17.40	17.16	15.96	15.60	17.16	17.45	17.34	17.28	17.16
22	18.16	18.10	17.70	17.39	17.14	15.88	15.58	17.22	17.45	17.36	17.23	17.16
23	18.16	18.08	17.70	17.38	17.14	15.85	15.57	17.28	17.44	17.36	17.23	17.17
24	18.19	18.07	17.66	17.36	17.10	15.84	15.58	17.33	17.42	17.34	17.24	17.17
25	18.19	18.05	17.70	17.37	17.10	15.84	15.69	17.37	17.42	17.31	17.24	17.17
26	18.18	18.03	17.70	17.37	17.08	15.81	15.73	17.43	17.43	17.32	17.22	17.17
27	18.15	17.98	17.67	17.34	17.07	15.83	15.86	17.47	17.43	17.32	17.22	17.15
28	18.18	17.92	17.65	17.32	17.06	15.80	16.02	17.49	17.43	17.32	17.23	17.14
29	18.19	.....	17.65	17.29	17.05	15.77	16.13	17.53	17.40	17.33	17.25	17.15
30	18.19	.....	17.66	17.30	17.04	15.78	16.17	17.57	17.39	17.33	17.25	17.15
31	18.13	.....	17.66	.....	17.03	.....	16.19	17.59	.....	17.32	.....	17.13

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-14-4cc.

Date	Water level	Date	Water level	Date	Water level
June 7, 1946	20.06	May 14, 1947	19.68	Sept. 3, 1948	21.85
July 10	20.68	July 11	17.68	Nov. 3	20.73
Aug. 7	22.42	Sept. 8	20.65	Jan. 6, 1949	20.45
Sept. 5	23.11	Nov. 4	19.65	Mar. 9	19.80
Oct. 7	21.80	Jan. 6, 1948	19.42	Apr. 13	19.52
Nov. 7	20.70	Mar. 9	19.11	July 5	17.58
Dec. 3	20.25	May 4	18.85	Sept. 6	20.33
Jan. 6, 1947	19.91	July 5	18.92	Nov. 1	19.47
Mar. 12	20.77				

9-14-13cb.

May 15, 1945	19.66	Sept. 5, 1946	21.55	Mar. 9, 1948	18.17
Oct. 18	19.33	Oct. 4	21.04	May 3	17.97
Dec. 12	19.30	Nov. 7	19.60	July 5	18.29
Jan. 17, 1946	19.32	Dec. 2	19.32	Nov. 3	19.53
Feb. 13	19.27	Jan. 6, 1947	19.08	Jan. 6, 1949	19.52
Mar. 13	19.22	Mar. 12	18.83	Mar. 9	18.92
Apr. 10	19.20	May 12	18.50	Apr. 13	18.75
May 8	19.20	July 11	15.30	July 5	16.69
June 7	19.15	Nov. 3	18.25	Sept. 6	18.31
July 10	19.75	Jan. 5, 1948	18.39	Nov. 1	18.19

9-14-19dd.

Jan. 29, 1945	25.09	Feb. 28, 1946	24.87	Mar. 12, 1947	24.37
Feb. 28	24.92	Mar. 29	24.71	Apr. 29	24.19
Mar. 29	25.03	Apr. 10	24.78	May 29	23.99
Apr. 30	24.85	29	24.71	June 27	23.69
May 29	24.79	May 29	24.92	July 29	23.20
June 29	24.79	June 28	24.70	Aug. 29	24.79
Aug. 29	25.39	July 10	24.79	Oct. 29	24.83
Sept. 29	25.64	29	25.90	Nov. 29	24.69
Oct. 29	25.19	Aug. 29	27.26	Dec. 29	24.62
Nov. 29	24.29	Sept. 29	26.86	Jan. 29, 1948	23.49
Dec. 29	24.92	Oct. 29	25.84	Mar. 9	24.36
Jan. 17, 1946	25.04	Nov. 29	25.29	29	23.34
29	25.00	Dec. 29	24.67	July 28	25.17

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-14-19dd--Continued.

Date	Water level	Date	Water level	Date	Water level
Aug. 28, 1948	25.79	Feb. 3, 1949	25.59	June 28, 1949	23.83
Sept. 28	26.18	Mar. 1	25.49	July 28	23.75
Oct. 30	25.87	28	25.26	Aug. 28	25.36
Nov. 28	25.93	Apr. 28	25.09	Oct. 29	24.96
Dec. 28	25.65	May 28	24.75	Nov. 30	24.83

9-14-21cc.

Oct. 18, 1945	19.67	Nov. 7, 1946	19.60	May 3, 1948	18.33
Dec. 12	19.25	Dec. 3	19.17	July 5	18.33
Jan. 17, 1946	19.20	Jan. 6, 1947	18.72	Aug. 5	19.78
Feb. 13	19.12	Mar. 12	18.45	Sept. 3	21.70
Mar. 13	19.04	Apr. 24	18.60	Nov. 2	20.30
Apr. 10	18.97	May 12	18.22	Jan. 6, 1949	19.95
May 8	18.90	July 11	17.49	Mar. 9	19.59
June 7	18.88	Nov. 3	19.08	Apr. 13	19.35
July 10	20.30	Jan. 6, 1948	18.88	July 5	17.50
Aug. 7	21.58	Mar. 9	18.70	Sept. 6	20.09
Oct. 7	20.19				

9-14-22bb.

July 10, 1946	17.27	Mar. 12, 1947	16.64	Aug. 3, 1948	17.18
Aug. 7	17.62	May 12	16.28	Jan. 6, 1949	17.56
Sept. 5	19.56	July 11	15.00	Mar. 9	17.32
Oct. 7	19.13	Jan. 6, 1948	16.53	Apr. 13	17.03
Nov. 7	17.86	Mar. 9	16.35	July 5	15.63
Dec. 3	17.48	May 5	16.03	Sept. 6	17.06
Jan. 6, 1947	17.05	July 5	16.05	Nov. 1	16.40

9-14-34bb.

Oct. 18, 1945	11.74	Apr. 10, 1946	11.15	Sept. 5, 1946	14.37
Dec. 12	11.52	May 8	11.36	Oct. 7, 1946	12.40
Jan. 17, 1946	11.82	June 7	11.35	Nov. 7	11.39
Feb. 13	11.27	July 10	12.47	Dec. 3	9.92
Mar. 13	11.18	Aug. 7	13.75	Jan. 6, 1947	10.15

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-14-34bb--Continued.

Date	Water level	Date	Water level	Date	Water level
Mar. 10, 1947	10.33	Mar. 9, 1948	11.00	Mar. 9, 1949	11.21
May 12	10.07	May 4	11.04	Apr. 13	10.59
July 11	10.05	Sept. 3	14.65	July 5	9.20
Sept. 8	13.45	Nov. 3	13.00	Sept. 7	12.73
Nov. 3	11.83	Jan. 6, 1949	12.20	Nov. 1	11.18
Jan. 6, 1948	11.65				

9-15-11cb.

Oct. 18, 1945	27.31	Oct. 7, 1946	28.08	May 4, 1948	24.82
Dec. 12	27.29	Nov. 7	27.35	July 5	25.10
Jan. 17, 1946	27.29	Dec. 3	27.20	Sept. 2	25.79
Feb. 13	27.30	Jan. 6, 1947	27.05	Nov. 3	26.15
Mar. 13	27.27	Mar. 12	26.78	10	26.22
Apr. 10	27.27	May 12	26.75	Jan. 7, 1949	26.33
May 8	27.32	July 11	23.67	Mar. 9	25.50
June 7	27.39	Sept. 8	24.40	Apr. 13	25.52
July 10	27.69	Nov. 4	24.87	July 5	23.97
Aug. 7	28.07	Jan. 6, 1948	25.09	Sept. 7	25.30
Sept. 5	28.39	Mar. 9	25.09	Nov. 1	25.55

9-15-16cc.

Sept. 5, 1946	35.02	Mar. 12, 1947	32.81	May 4, 1948	31.88
Oct. 7	34.29	May 12	32.62	July 5	31.90
Nov. 7	33.84	July 11	32.24	Sept. 3	34.15
Dec. 3	33.45	Jan. 6, 1948	32.56	Apr. 13, 1949	32.47
Jan. 6, 1947	33.19	Mar. 9	33.75		

9-15-34bb.

Oct. 8, 1945	20.58	Mar. 12, 1947	18.57	Mar. 9, 1948	20.15
Dec. 12	20.33	Apr. 10	20.75	July 5	21.47
Jan. 17, 1946	20.33	May 12	18.35	Sept. 3	22.37
Feb. 13	20.63	July 11	18.46	Nov. 3	25.35
Mar. 13	20.50	Nov. 4	21.03	Jan. 7, 1949	23.83
Apr. 10	20.75	Jan. 6, 1948	20.02	Mar. 9	22.50

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Buffalo County--Continued

9-15-34bb--Continued.

Date	Water level	Date	Water level	Date	Water level
Apr. 13, 1949	20.80	Sept. 7, 1949	20.85	Nov. 1, 1949	19.82
July 5	18.80				

10-13-24bc.

Mar. 13, 1946	24.25	Jan. 6, 1947	24.65	July 13, 1948	24.11
Apr. 10	24.16	Mar. 10	24.34	Sept. 2	25.47
May 8	24.14	May 12	24.17	Nov. 3	24.86
June 6	24.06	July 10	23.44	Jan. 6, 1949	24.60
July 10	24.02	Nov. 3	25.30	Mar. 9	24.35
Sept. 5	26.28	Jan. 5, 1948	25.17	Apr. 11	24.07
Oct. 4	25.42	Mar. 9	24.90	July 5	22.75
Nov. 6	25.05	May 3	24.49	Sept. 6	24.19
Dec. 2	24.88	July 5	24.15	Nov. 1	23.23

Hall County

9-11-8bc.

Dec. 12, 1945	6.37	Oct. 4, 1946	7.18	May 3, 1948	6.22
Jan. 18, 1946	5.92	Nov. 6	5.75	July 5	6.76
Feb. 13	5.92	Dec. 2	4.65	Sept. 3	7.33
Mar. 13	5.93	Jan. 6, 1947	5.71	Nov. 3	7.35
Apr. 10	5.90	Mar. 7	5.62	Jan. 6, 1949	6.65
May 8	6.35	May 12	5.80	Mar. 9	5.00
June 7	6.49	July 10	5.60	Apr. 11	4.05
July 10	6.73	Nov. 3	7.39	July 5	5.60
Aug. 7	7.62	Jan. 5, 1948	6.87	Sept. 6	7.40
Sept. 5	7.82	Mar. 10	6.22	Nov. 1	6.91

9-12-1dc.

Oct. 18, 1945	4.11	Mar. 13, 1946	4.75	July 10, 1946	5.42
Dec. 12	5.02	Apr. 10	4.37	Aug. 7	6.68
Jan. 18, 1946	4.97	May 8	4.89	Sept. 5	7.26
Feb. 13	4.93	June 7	5.19	Oct. 4	6.77

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Hall County--Continued

9-12-1dc--Continued.

Date	Water level	Date	Water level	Date	Water level
Nov. 12, 1946	3.80	Nov. 3, 1947	7.59	Jan. 6, 1949	6.82
Dec. 2	3.29	Jan. 5, 1948	7.22	Mar. 9	5.25
Jan. 6, 1947	4.15	Mar. 10	6.70	Apr. 11	3.72
Mar. 8	4.12	May 3	5.66	July 5	5.12
May 12	4.24	July 5	6.41	Sept. 6	6.69
July 10	5.03	Nov. 3	7.32	Nov. 1	6.58

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Hall County--Continued

9-12-9ba. Water level, 1945: May 15, 22.61; Oct. 18, 21.72; Dec. 12, 21.88.

Lowest daily water level, Dec. 27, 1945 to Mar. 26, 1947
[Accuracy of record for May 10-17, 1946 is questionable]

Day	Dec. 1945	Jan. 1946	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan. 1947	Feb.	Mar.
1	.....	21.97	22.00	21.95	21.78	.....	.....	21.86	22.40	23.30	22.82	21.47	.....	.....	.....	21.07
2	.....	21.94	22.00	21.96	21.79	.....	.....	21.85	22.43	23.32	22.81	21.49	20.90	.....	.....	.....
3	.....	21.94	21.98	21.93	21.82	21.90	.....	21.83	22.48	23.33	22.80	21.50	20.91	.....	.....	.....
4	.....	21.96	21.97	21.95	21.84	.....	.....	.....	22.52	23.33	22.80	21.50	20.89	21.02	.....	.....
5	.....	21.96	21.97	21.94	21.83	.....	.....	.....	22.57	23.33	22.79	21.47	20.89	20.99	.....	.....
6	.....	22.02	21.98	21.93	21.79	.....	22.03	.....	22.60	23.35	22.77	21.43	20.88	20.98	.....	.....
7	.....	22.02	21.97	21.95	21.78	21.89	22.06	.....	22.62	23.35	22.73	.....	20.87	21.04	.....	.....
8	.....	21.98	22.00	21.95	21.80	21.89	22.08	.....	22.66	23.35	22.67	.....	20.89	21.06	21.18	21.12
9	.....	21.99	22.00	21.95	21.80	21.96	22.07	.....	22.71	23.35	22.53	.....	20.89	21.06	21.18	21.15
10	.....	21.99	21.95	21.96	21.74	21.96	22.06	21.90	22.74	23.35	22.46	.....	.....	20.99	21.17	21.15
11	.....	21.98	21.96	21.91	21.83	21.97	.....	.....	22.77	23.35	22.24	.....	20.84	21.00	21.18	21.12
12	.....	22.00	21.95	21.89	21.83	21.97	.....	21.92	22.80	23.35	22.07	.....	20.90	20.99	21.15	21.14
13	.....	21.98	21.95	21.90	21.79	21.96	.....	21.91	22.84	.....	21.98	.....	20.90	20.98	21.16	21.14
14	.....	21.96	21.96	21.90	21.80	21.98	.....	21.94	22.87	.....	21.92	.....	20.89	21.04	21.15	21.14
15	.....	21.97	21.96	21.89	21.82	21.99	.....	21.94	22.90	.....	21.86	21.27	20.87	21.07	21.12	21.15
16	.....	21.94	21.97	21.90	21.83	21.98	.....	21.93	22.93	23.10	21.81	21.26	20.95	21.07	21.07	.....
17	.....	21.95	21.98	21.90	21.81	21.98	.....	21.93	22.95	23.09	21.78	21.18	20.95	21.09	21.05	.....
18	.....	21.94	21.96	21.90	21.82	.....	.....	21.94	.....	23.08	.....	21.11	20.93	21.09	21.07	.....
19	.....	21.94	21.95	21.88	21.86	.....	.....	21.96	.....	23.06	21.59	21.06	.....	21.05	21.05	21.14
20	.....	21.97	21.95	21.85	21.86	.....	.....	21.98	.....	23.02	21.60	21.04	.....	.....	21.05	21.14
21	.....	21.97	21.93	21.81	21.89	.....	.....	21.99	.....	22.98	21.58	21.07	.....	.....	21.03	21.12
22	.....	21.96	21.94	21.81	21.89	.....	.....	22.00	.....	22.96	21.56	21.05	.....	.....	21.05	21.09
23	.....	21.96	21.95	21.79	21.88	.....	.....	22.07	23.14	22.94	21.54	20.98	.....	.....	21.06	21.10
24	.....	21.96	21.96	21.79	21.88	22.00	.....	22.09	23.15	22.92	21.53	21.00	.....	.....	21.06	21.14
25	.....	21.95	21.93	21.79	21.89	.....	21.85	22.13	23.18	22.91	21.51	20.99	.....	21.10	21.07	21.15
26	.....	22.00	21.96	21.79	.....	.....	21.84	22.15	23.20	22.90	21.50	20.95	.....	21.09	21.08	21.14
27	22.00	21.98	21.97	21.80	.....	22.03	21.84	22.20	23.21	22.88	.....	20.97	20.88	21.13	21.06	.....
28	21.96	21.99	21.95	21.77	.....	22.03	21.84	22.23	23.23	22.85	.....	20.92	.....	21.13	21.05	.....
29	21.95	21.94	.....	21.79	.....	22.02	21.84	22.26	23.26	22.84	21.49	20.92	.....	21.08	.....	.....
30	21.97	21.96	.....	21.81	21.89	.....	21.85	22.30	23.27	22.83	21.51	.....	.....	21.12	.....	.....
31	21.98	21.96	.....	21.80	.....	.....	.....	22.34	23.29	.....	21.50	.....	.....	21.13	.....	.....

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Hall County--Continued

9-12-9ba--Continued.

Date	Water level	Date	Water level	Date	Water level
May 12, 1947	20.68	May 3, 1948	21.30	Mar. 9, 1949	21.40
July 10	19.63	July 5	20.95	Apr. 12	20.80
Nov. 3	22.12	Sept. 3	22.35	July 5	18.50
Jan. 5, 1948	22.14	Nov. 3	22.19	Sept. 6	20.80
Mar. 10	22.95	Jan. 6, 1949	22.15	Nov. 1	20.70

10-11-30bc.

Date	Water level	Date	Water level	Date	Water level
May 15, 1945	20.78	Aug. 7, 1946	21.93	Jan. 5, 1948	19.00
Oct. 18	21.87	Sept. 5	22.40	Mar. 10	19.08
Dec. 12	20.56	Oct. 4	21.91	May 3	18.75
Jan. 18, 1946	20.54	Nov. 6	20.97	July 5	18.71
Feb. 13	20.52	Dec. 2	20.72	Nov. 3	19.56
Mar. 13	20.51	Jan. 6, 1947	20.40	Jan. 6, 1949	19.63
Apr. 10	20.47	Mar. 8	20.21	Mar. 9	19.51
May 8	20.55	May 12	19.95	Apr. 11	19.40
June 7	20.52	July 10	18.88	July 5	17.50
July 10	20.40	Nov. 3	19.04	Nov. 1	18.49

10-12-20dd.

Date	Water level	Date	Water level	Date	Water level
Feb. 13, 1946	28.89	June 7, 1946	29.03	Nov. 6, 1946	29.93
Mar. 13	28.85	July 10	28.78	Dec. 2	29.74
Apr. 10	28.77	Sept. 5	30.67	Measurements discontinued	
May 8	28.83	Oct. 4	30.29		

10-12-21cc.

Date	Water level	Date	Water level	Date	Water level
July 10, 1947	28.50	July 5, 1948	27.86	Apr. 12, 1949	27.95
Nov. 3	28.72	Sept. 3	29.05	July 5	27.22
Jan. 5, 1948	28.55	Nov. 3	28.37	Sept. 6	29.45
Mar. 10	28.30	Jan. 6, 1949	28.37	Nov. 1	28.27
May 3	28.02	Mar. 9	28.20		

Table 3.--Water-level measurements in wells, in feet below land-surface datum--Continued

Hall County--Continued

11-12-34dc.

Date	Water level	Date	Water level	Date	Water level
June 7, 1946	25.70	May 12, 1947	26.05	Sept. 3, 1948	27.58
July 10	25.68	July 10	25.72	Nov. 3	26.50
Sept. 5	26.82	Sept. 5	26.78	Jan. 6, 1949	26.29
Oct. 4	26.68	Nov. 3	26.60	Apr. 11	26.10
Nov. 6	26.29	Jan. 5, 1948	26.56	July 5	25.59
Dec. 2	26.24	Mar. 10	26.48	Sept. 6	26.40
Jan. 6, 1947	26.17	May 3	26.39	Nov. 1	26.15
Mar. 10	26.17	July 5	26.31		

Table 4.--Pumping data for irrigation wells in the Wood River unit, Nebr.

Type of power: E, electric motor; G, gasoline engine; NG, natural gas engine; T, tractor

Well number	Operator	Make of turbine	Power	Inside diameter of discharge pipe (inches)	Pumping depth to water below measuring point (feet)	Total pumping lift to center of discharge pipe (feet)	Approximate drawdown (feet)	Yield (gpm)	Specific capacity (gpm per foot of drawdown)	Power input (horsepower)	Plant efficiency (percent)	Date of test	Remarks
				Buffalo County									
8-15-2cbc	Herman Wilkens.......	Peerless....	E	8.27	17.25	18.58	9.93	1,400	140.0	15.19	43.3	8-14-48	
-3bbb	Ed Smallcomb.........	Dempster....	T	7.06	.....	.....	.....	600	.....	.....	....	8-14-48	
-3bbc	.....do..............	Peerless....	E	7.69	27.10	27.25	9.95	970	97.5	11.17	57.6	8-14-48	
-4ccc	John Lade............	Fairbanks-Morse	E	8.22	.....	.....	.....	1,098	.....	13.6	59.3	8-16-48	
-5bac	Wendell Snyder.......	Peerless....	E	8.44	31.92	32.67	10.60	1,140	107.5	15.88	59.3	8-16-48	
-5bbb	.....do..............	....do......	E	7.63	29.45	29.60	8.50	1,182	139.1	13.91	63.5	8-16-48	(1)
-5bcc	.....do..............	....do......	E	7.63	33.35	33.50	13.00	1,119	86.0	14.19	66.8	8-16-48	
-5cbc	A. L. Greenemyre.....	....do......	E	8.27	31.45	31.60	9.06	1,070	118.1	14.25	59.9	8-14-48	
9-13-4abb	A. F. Stenehjem......	....do......	E	7.63	.....	.....	.....	800	.....	10.43	....	8-21-48	
-4cdd	D. E. Hayman.........	Layne-Bowler	E	8.34	25.32	25.33	11.32	994	87.8	12.7	49.9	8-20-48	
-5bcb	T. A. Powers.........	Pomona......	E	7.68	38.70	39.04	11.20	1,050	93.7	16.78	61.9	8-23-48	
-6abb	M. D. Brandt.........	Peerless....	E	8.27	.....	.....	.....	1,085	.....	.....	....	8-23-48	
-6bba	T. R. Faser..........	....do......	E	8.27	39.40	39.49	14.68	1,090	74.3	18.22	59.7	8-22-48	
-6ccd	Horace Kirk..........	....do......	E	8.07	.....	.....	.....	852	.....	.....	....	8-21-48	
-7cba	C. S. Reeds..........	Dempster....	E	6.16	.....	.....	.....	610	.....	12.20	....	8-25-48	
-8bbb	D. H. Nutter.........	Sides.......	E	8.07	30.56	30.90	11.86	697	58.8	14.67	37.2	8-20-48	
-8ccc	Harris Bros..........	Peerless....	E	8.47	30.25	30.35	11.13	1,104	99.0	14.09	60.2	9- 3-48	
-9bba	R. A. Stafford.......	Johnson.....	E	8.19	28.5	28.7	10.5	1,000	95.0	11.5	63	8-25-48	
-11bbc	Geo. Waddington......	Peerless....	E	8.28	48.25	48.4	33.23	885	26.6	.....	....	8-21-48	
-12cbc	H. Wendling..........	....do......	E	8.28	.....	.....	.....	1,124	.....	.....	....	8-26-48	
-13bbb	Thurl Resh...........	Webber......	E	7.65	.....	.....	.....	725	.....	12.48	....	8-26-48	
-14bbb	Walter Lewis.........	Peerless....	E	7.63	35.63	35.7	17.63	1,028	58.3	14.32	64.7	8-27-48	
-14cbc	G. W. Wellensick.....	....do......	E	7.63	34.02	34.09	16	977	61.0	13.52	61.9	8-26-48	
-16cbb2	Pete Sommers.........	Webber......	E	8.25	.....	.....	.....	896	.....	17.3	....	8-26-48	
-17bbc	Neally Wensel........	....do......	NG	7.97	.....	.....	.....	756	.....	.....	....	8-26-48	
-17ccc	Pete Sommers.........	Peerless....	E	8.25	36.10	36.19	19.11	994	52.0	16.3	55.2	8-27-48	
-18aca	Neally Wensel........	Webber......	NG	7.88	.....	.....	.....	1,120	.....	.....	....	8-26-48	

-19dcc	R. F. Snyder.........	Peerless....	E	8.31	.....	.....	.....	750	.....	10.68	....	8-27-48
9-14-1bcb	M. D. Brandt.........	....do......	E	8.37	.....	.....	.....	845	.....	12.5	....	8-19-48
-2bba	Walter Bennett.......	Pomona......	E	8.06	43.50	44.25	13.54	715	52.8	14.7	54.5	8-18-48
-3abb	Glen DeBruler........	Western.....	E	6.13	54.8	55.31	19.8	466	23.5	11.9	54.8	8-18-48
-5cbc	Glen Covert..........	Peerless....	E	7.63	.....	.....	.....	658	.....	9.43	....	8-19-48
-7bcc	R. T. Rogers.........	....do......	E	7.56	.....	.....	.....	725	.....	11.09	....	8-19-48
-7ccc	.....do..............	....do......	E	6.16	.....	.....	.....	563	.....	8.89	....	8-19-48
-9bbb	Henry Moss...........	Sides.......	E	8.13	.....	.....	.....	600	.....	11.05	....	8-19-48
-11cbc	Harold Clark.........	Peerless....	E	7.63	37.25	37.40	10.08	1,072	107.2	17.73	57.2	8-19-48
-16dad	John Fitzgerald......	....do......	E	8.19	37.12	37.21	9.89	906	91.5	16.9	50.4	8-30-48
-17cbc	Earl Hammonds........	....do......	E	7.26	31.28	32.03	....	954	.....	12.59	61.4	8-30-48
-19bbc	Arthur W. Bendtfeldt.	....do......	E	7.72	40.45	41.77	15.13	1,000	66.1	17.1	61.8	8-31-48
-21ccb	H. J. Deets..........	....do......	E	7.63	.....	.....	.....	878	.....	10.06	....	8-31-48
-22bcb	Ray Francis..........	....do......	E	7.63	21.95	22.02	.....	937	.....	9.04	57.7	8-27-48
-22cbb	Richard Clark........	....do......	E	7.63	31.97	32.22	17.91	954	.....	10.9	71.9	8-18-48
-25abc	Earl Johnson.........	Fairbanks-Morse	E	8.31	40.76	41.61	.....	1,043	.....	18.5	59.4	9- 1-48
-25bbb	Tom Ice..............	Centrifugal	E	6.06	21.64	24.39	.....	625	.....	8.25	46.75	9- 1-48
-26cbb	E. M. Applegate......	Western.....	E	8.25	22.06	22.90	9.00	878	97.6	9.66	52.7	9- 1-48
-27bbd	A. F. Stenehjem......	Pomona......	E	8.09	24.81	27.15	9.12	1,477	161.9	17	59.7	9- 2-48 (2)
-27cca	Wayne Mawhinney......	Peerless....	E	7.63	26.75	26.82	12.95	1,311	101.2	18.4	48.7	9- 1-48
-29cbc	K. B. Gahagen........	....do......	E	7.66	29.98	30.13	12.77	1,123	87.9	14.22	60.2	9- 2-48
-30ccb	W. E. Hendrickson....	....do......	E	7.63	21.32	21.47	.....	.....	.....	13.09	37.5	9- 2-48
-32bbb	A. E. Gahagen........	....do......	E	7.66	24.50	24.65	9.41	960	102.1	10.86	55.1	9- 2-48
-33bbb	Joe Erpelding........	Fairbanks-Morse	E	8.09	25.58	26.33	10.53	1,288	122.3	15.4	55.6	9- 2-48
9-15-11acd	K. S. Gotobed........	....	E	6.36	52.40	53.15	22.51	494	22.0	10.89	60.9	8-25-48
-13bbb	C. O. Newland........	Fairbanks-Morse	E	8.31	38.30	39.05	.....	994	.....	16.1	60.9	8-25-48
-13bcd	.....do..............	....do......	E	7.69	34.02	34.77	.....	957	.....	14.13	59.6	8-24-48
-14bcc	Warren Reynolds......	Peerless....	E	8.38	43.35	43.50	.....	1,110	.....	18.4	66.3	8-24-48
-14ccc	.....do..............	....do......	E	7.63	39.9	40.05	.....	865	.....	14.48	60.5	8-24-48
-14cdc	.....do..............	....do......	E	7.63	.....	.....	.....	1,040	.....	17.11	....	8-24-48
-20acd	Fred Sitz............	....do......	E	8.41	46.67	49.31	.....	840	.....	15.6	66.1	8-24-48
-20dcc	K. F. Brandt.........	Fairbanks-Morse	E	8.31	55.00	55.75	.....	796	.....	18.10	62.0	8-24-48
-21bcb	Wendell Wilkie.......	Peerless....	E	7.75	46.8	46.95	.....	960	.....	17.52	65.0	8-24-48
-21cbb	C. R. Arbuckle.......	....do......	E	7.75	45.75	45.90	.....	832	.....	19.19	50.3	8-24-48
-23bbc	J. Erpelding.........	....do......	E	8.28	44.45	44.90	.....	1,075	.....	18.37	66.5	8-24-48
-24ccc	Wm. Marcus...........	....do......	E	8.25	.....	.....	.....	1,162	.....	18.51	....	8-25-48
-25cbb	H. F. Starkey........	....do......	E	8.38	.....	.....	.....	1,124	.....	15.62	....	8-25-48
-29bab	L. L. Donally........	....	E	8.00	.....	.....	.....	812	.....	22.00	....	8-25-48
-32abb	Don Slaughter........	Peerless....	E	7.69	.....	.....	.....	564	.....	8.47	....	8-23-48

See footnotes at end of table.

Table 4.--Pumping data for irrigation wells in the Wood River unit, Nebr.--Continued

Well number	Operator	Make of turbine	Power	Inside diameter of discharge pipe (inches)	Pumping depth to water below measuring point (feet)	Total pumping lift to center of discharge pipe (feet)	Approximate drawdown (feet)	Yield (gpm)	Specific capacity (gpm per foot of drawdown)	Power input (horsepower)	Plant efficiency (percent)	Date of test	Remarks
			Buffalo County--Continued										
9-15-33acc	Earl Snyder..........	Peerless....	E	7.71	32.75	32.90	.....	870	.....	13.3	54.4	8-23-48	
-33dab	Ed Smallcomb.........	....do......	E	7.77	32.92	33.07	.....	828	.....	13.38	51.8	8-23-48	
-34bbc	Cecil Wolford........	....do......	E	7.72	.....	.....	.....	912	.....	13.22	....	8-23-48	
-34cbb	Ross May.............	....do......	E	8.28	26.80	26.95	.....	1,200	.....	14.86	53.3	8-24-48	
-35bcb	Eugene Reynolds......	....do......	E	7.7	30.15	30.30	10.73	1,100	102.4	13.42	62.8	8-24-48	
-35ccb	Wayne Mawhinney......	....do......	E	10.25	.....	.....	.....	1,860	.....	14.04	....	8-24-48	
-35cdc	.....do..............	....do......	E	8.23	22.64	22.79	.....	950	.....	10.87	50.3	8-24-48	
-36bbc	Edgar Reynolds.......	....do......	E	7.75	29.67	29.83	8.27	878	106.1	10.96	60.5	8-25-48	
-36cbc	Paul Reynolds........	....do......	E	8.46	.....	.....	.....	909	.....	9.72	....	8-25-48	
10-13-13ccc	Ralph Lewis..........	Layne-Bowler	E	8.09	39.70	40.34	14.70	723	49.2	11.5	64.2	8-26-48	
-21ddc	F. S. Henninger......	Peerless....	E	7.56	46.47	47.39	21.34	534	25.0	10.15	63.1	8-26-48	
-22ccb	E. D. Hendrickson....	....do......	E	6.34	.....	.....	.....	369	.....	7.79	....	8-26-48	
-23ddc	Ralph Schanau........	....do......	E	7.66	41.95	42.27	18.45	514	37.9	10.48	52.4	8-26-48	
-25acd	Robert Vohland.......	Pomona......	E	7.68	40.80	41.32	13.91	741	53.2	15.50	49.8	8-26-48	
-25bcd	.....do..............	Peerless....	E	8.62	39.00	39.33	16.64	995	60.8	15.88	62.3	8-26-48	
-26cbb	B. M. Rice...........	....do......	E	6.10	42.15	42.15	17	539	31.7	8.38	68.6	8-26-48	
-27dcc	Leland Gangwish......	Pacific.....	T	8.29	.....	.....	.....	740	.....	.....	....	8-26-48	
-28bcc	Weston Bros..........	Peerless....	E	7.56	50.10	50.17	21.22	913	43.0	17.08	54.2	8-21-48	
-31ccb	Louis Delgado........	....do......	E	7.52	44.15	44.21	17.46	827	47.3	15.20	60.8	8-21-48	
-32bbc	H. Widdowson.........	....do......	E	7.68	39	39.07	.....	840	.....	12.88	64.5	8-20-48	
-33bcb	Weston Bros..........	....do......	E	8.37	39.20	39.30	14.71	823	55.9	13.75	59.6	8-20-48	
-33ccb	Harvey Deets.........	....do......	E	8.29	40.65	40.75	21.80	866	41.1	14.12	63.2	8-21-48	
-34bbb	Orval Ross...........	....do......	E	8.07	42.60	42.69	20.60	615	29.8	13.20	50.3	8-21-48	
-35bca	Alfred Rowe..........	Layne.......	E	8.09	38.97	39.61	17.50	1,000	57.1	16.78	59.8	8-21-48	
-35ccc	Cleo Mayfield........	Peerless....	E	7.56	33.90	33.97	16.36	660	40.3	10.34	54.8	8-21-48	
-35dcc	R. L. Mackey.........	Layne-Bowler	E	8.09	32.20	32.84	13.78	802	57.1	11.78	56.7	8-21-48	
-36bbb	Geo. Woten...........	Peerless....	E	8.09	42.70	42.79	20.03	1,050	52.4	17.6	64.6	8-23-48	
-36cbb	.....do..............	....do......	E	6.69	38.60	38.63	18.06	556	30.8	9.22	59.0	8-23-48	
10-14-35add	Hemmerling Bros......	Western.....	E	6.53	62.38	63.13	19.05	620	32.6	21.2	46.7	9- 2-48	

Hall County

9-12-7bcb	R. H. Ohlman..........	Peerless....	E	7.63	26.25	26.88	10.75	875	81.3	10.87	55.6	8-17-48
10-11-30bbb	Wm. Boeka..........	Western.....	NG	8.25	42.50	43.2	15.00	1,038	92.0	.....	....	7-22-48
-30bcc	.....do..........	....do......	..	8.41	38.25	38.95	18.00	1,014	53.7	.....	....	7-22-48
10-12-1acd	Wayne Binfield.......	Layne-Bowler	E	8.13	.....	.....	.....	943	.....	15.8	....	7-27-48
-1dbd	J. H. Jacobs.........	Peerless....	E	6.70	45.17	45.67	12.67	662	52.3	15.32	49.8	7-27-48
-3bcc	Charles Backora......	Western.....	E	8.27	45.34	46.09	14.70	705	48.0	15	55.8	7-28-48
-4bdc	Don Schnazy..........	....do......	E	8.35	.....	.....	.....	500	.....	11.5	....	7-27-48
-4ccc	E. F. Frazell........	Fairbanks-Morse	E	8.28	44.30	44.90	15.24	721	47.3	12.67	64.7	7-28-48
-8dcc	Louis Brandt.........	Western.....	E	7.62	42.85	43.60	12.51	504	33.8	12.51	44.4	7-28-48
-11dcd	Melvin Backstadtler..	Peerless....	E	8.02	44.65	44.80	11.48	909	79.2	15.95	64.5	7-23-48
-14ccb	Lyle Fairbanks.......	Western.....	G	8.19	35.30	36.05	9.35	1,005	112.4	.....	....	7-23-48
-14cac	.....do..........	Sides.......	T	8.22	.....	.....	.....	385	.....	.....	....	7-23-48
-14dab	Will Leonard.........	Byron-Jackson	E	7.69	.....	.....	.....	759	.....	8.32	....	7-23-48
-18ccc	Herb Arnold..........	Peerless....	E	6.25	.....	.....	.....	351	.....	8.22	....	7-21-48
-18ddd	Erwin Holtz..........	Fairbanks-Morse	E	6.22	43.14	43.89	13.82	553	40.0	10.87	56.5	7-21-48
-19ada	Del Frazell..........	....do......	..	8.10	50.87	51.62	12.05	864	71.7	16.17	69.8	7-23-48
-19bcc	Dubbs................	Peerless....	T	7.94	41.90	42.05	14.75	630	42.7	.....	....	7-26-48
-19cbc	Stuart Schepers......	Layne-Bowler	T	8.06	43.50	44.25	15.90	764	48.1	.....	....	7-21-48
-20ccd	Del. Lewis...........	Fairbanks-Morse	E	8.28	45.70	46.45	16.75	857	51.2	14.7	67	6-22-48
-21ccb	Owen Knight..........	Peerless....	E	8.16	44.65	45.40	16.73	652	38.9	13.23	56.5	6-22-48
-21dcb	Roy Watson...........	....do......	E	8.22	41.21	41.36	15.59	903	57.9	18.5	51.1	7-28-48
-22ccb	.....do..........	....do......	E	7.53	38.96	39.11	14.96	944	63.1	16.82	55.4	7-28-48
-24bbc	John Franke..........	Western.....	E	8.25	33.86	34.61	13.56	974	85.4	13.56	62.8	10-12-48
-24ccd	Ed. Wick.............	....do......	..	8.22	32.67	33.42	13.12	767	58.4	13.91	46.6	7-23-48
-25ccc	Gus Holling..........	....do......	T	8.28	33.85	34.60	16.19	1,103	65.2	.....	....	7-22-48
-25dcc	Engelhardt...........	Pioneer.....	T	8.20	26.72	27.47	10.65	677	63.6	.....	....	7-22-48
-26abb	Rohrich..............	....do......	T	8.26	30.10	30.85	10.74	1,180	109.8	.....	....	7-23-48
-26da	Neal Burmood.........	Western.....	T	8.28	28.45	29.20	9.81	858	87.5	.....	....	7-22-48
-27bda	N. J. McGuire........	....do......	E	8.25	36.49	37.24	14.27	1,114	78.2	19.97	52.6	7-23-48
-27cbc	Carl Nelson..........	....do......	E	8.31	31.12	31.87	11.02	1,128	102.2	15.8	57.5	7-23-48
-27ccd	.....do..........	Fairbanks-Morse	E	8.31	.....	.....	.....	965	.....	.....	....	7-26-48
-30bb	B. O. Meyers.........	Western.....	E	8.25	43.15	43.90	13.50	813	53.8	13.5	66.8	7-24-48
-31ccb	Fred Wiseman.........	Pioneer.....	NG	8.10	.....	.....	.....	864	.....	.....	....	7-21-48
-31ccc	.....do..........	....do......	..	8.19	31.10	31.85	12.05	805	66.8	.....	....	7-22-48
-31dba	Platte Valley Academy	Western.....	NG	8.25	34.25	35.00	15.08	928	61.5	.....	....	7-26-48
-32bbc	R. L. Mackey.........	Layne-Bowler	T	8.38	37.05	37.80	14.72	913	62.0	.....	....	7-24-48
-33dcb	Harlan O'Brien.......	Sides.......	NG	8.66	.....	.....	.....	839	.....	.....	....	7-26-48
-33dcc	Ramsay...............	Peerless....	NG	7.63	.....	.....	.....	928	.....	.....	....	7-26-48
-34abc	Jim Pierce...........	....do......	NG	8.19	.....	.....	.....	731	.....	.....	....	7-26-48
-34bac	Edward Ostberg.......	Western.....	E	8.41	32.47	33.22	9.93	1,059	106.7	15.12	58.2	7-22-48
-36aab	Rathman..............	Evans.......	T	8.19	.....	.....	.....	657	.....	.....	....	7-22-48

Table 4.--Pumping data for irrigation wells in the Wood River unit, Nebr.--Continued

Well number	Operator	Make of turbine	Power	Inside diameter of discharge pipe (inches)	Pumping depth to water below measuring point (feet)	Total pumping lift to center of discharge pipe (feet)	Approximate drawdown (feet)	Yield (gpm)	Specific capacity (gpm per foot of drawdown)	Power input (horsepower)	Plant efficiency (percent)	Date of test	Remarks
			Hall County--Continued										
10-12-36ccc	Ben Boltz............	Fairbanks-Morse	E	8.28	33.30	34.05	16.43	828	50.3	16	44.6	7-22-48	
11-12-11bcc	K. Hinkson...........	Western.....	E	6.09	60.95	61.70	12.22	355	29.0	11.01	50.2	7-28-48	
-14cbc	Alan Schuett.........	Fairbanks-Morse	G	6.09	44.89	45.64	9.78	355	36.3	.....	....	7-28-48	
-26ccc	J. L. Plejdrup.......	Western.....	T	8.44	44.97	45.72	16.27	859	52.8	.....	....	7-28-48	
-28bab	Myles Dibbern........	Peerless....	T	5.74	49.81	49.96	11.05	314	28.4	.....	....	7-28-48	
-33cbb	Wm. Dubbs............	....do......	E	5.72	44.02	44.17	15.48	240	15.5	8.03	33.4	7-12-48	

1 Pump operated 10 min.
2 Elbow in discharge pipe.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.

Type of casing: B, brick; C, concrete, GI, galvanized iron; I, iron; S, steel; SW, screen wire; T, tile; W, wood.
Kind of pump: HC, horizontal centrifugal; T, turbine; VC, vertical centrifugal.

Type of power: E, electric motor; G, gasoline engine; NG, natural-gas engine; P, propane-gas engine; T, tractor.
Yield: E, estimated; M, measured; R, reported.
1947 pumpage: C, computed; R, reported.

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County										
8-14-5aab	Wayne Kenton.....	50	18	....	Top of casing...........	0.0	4.65	8-10-48	HC	T	800R	.....	......	300R	44.2
-5abb	.....do..........	60	.....	....	Hole in turbine base.....	+.5	5.69	8-10-48	T	T	1,450R	.....	......	......	......
8-15-1bbb	A. C. Lund.......	49	.....	....	Hole in base............	+.5	14.16	8- 2-48	T	G	800R	.....	......	240R	35.4
-2abb	C. Wolford.......	61	.....	....	.....do.................	+.5	14.94	8-10-48	T	E	800R	.....	......	397C	58.5
-2acc	Harold Burtiss...	51	.....	....	.....do.................	+1.0	6.15	8-10-48	T	E	1,000R	.....	......	375C	69.0
-2bbd	A. Peterson......	56	18	....	.....do.................	.0	14.02	3-15-49	T	T	600R	.....	......	276R	30.5
-2bcd	Ray Noltz........	38	.....	....	.....do.................	+1.2	13.79	3-15-49	T	T	700R	.....	......	394R	37.9
-2cbc	Herman Wilkens...	54	.....	....	.....do.................	+1.5	7.32	8- 2-48	T	E	1,290M	9.93	2½ hr	384C	91.3
-2ccb	.....do..........	...	.....	....	No measuring point.......	....	.....	....	T	T	800R	.....	......	256R	38.7
-2dcb	Arnold Peterson..	...	.....	....	Hole in base............	+1.0	5.92	8- 5-48	T	E	900R	.....	......	370C	61.3
-3aac	A. L. Greenamyre.	50	.....	....	.....do.................	+.5	14.40	8- 2-48	T	T	1,100R	.....	......	540R	109.3
-3abb	R. Hartman.......	...	.....	....	.....do.................	+1.0	14.46	8-10-48	T	E	950R	.....	......	60C	105.0
-3acc	Delbert Lewis....	...	.....	....	.....do.................	+1.0	14.93	8-10-48	T	E	700R	.....	......	516C	66.6
-3bbb	Ed Smallcomb.....	...	.....	....	Top of steel beam........	.0	16.08	8- 3-48	VC	T	554M	.....	......	288R	29.4
-3bbc	.....do..........	62	.....	....	Hole in side............	+1.0	17.15	8- 2-48	T	E	900R	9.95	......	787C	130.5
-3bcc	.....do..........	...	.....	....	Top of steel beam........	.0	15.57	8- 2-48	VC	G	400E	.....	......	570R	42.0
-3cbb	Wayne Peterson...	43	.....	....	Edge of base............	+1.0	17.12	7-29-48	T	T	600R	.....	......	216R	23.9
-3dcc	Reuben Hartman...	...	.....	....	Hole in side............	+1.0	9.07	8- 3-48	T	E	1,080R	.....	......	357C	71.0
-4aab	Hubert Green.....	45	.....	....	.....do.................	+1.0	18.05	8- 4-48	T	E	850R	.....	......	430C	67.3
-4acb	.....do..........	62	.....	....	.....do.................	+.5	18.17	8-12-48	T	E	1,000R	.....	......	565C	104.0
-4bcb	.....do..........	...	.....	....	.....do.................	+.5	20.05	7-29-48	T	E	1,000R	.....	......	621C	114.3
-4cbb	John Lade........	...	.....	....	.....do.................	+.5	17.75	7-29-48	T	E	1,000R	.....	......	281C	51.7
-4bbc	Hubert Green.....	...	.....	....	.....do.................	+1.5	21.03	7-29-48	T	E	850R	.....	......	705C	110.4
-4ccc	John Lade........	56	.....	....	.....do.................	.0	12.95	7-29-48	T	T	1,000R	.....	......	140R	25.8
-4dbb	Fred Notz........	...	.....	....	.....do.................	....	(a)	8-12-48	T	E	900E	.....	......	704C	116.7
-5aad	G. F. Van Arsdale	...	.....	....	No measuring point.......	....	.....	....	T	T	700R	.....	......	144R	18.6
-5acb	Joe Belnudez.....	...	.....	....	.....do.................	....	19	Estimated	T	E	700R	.....	......	344C	44.4
-5abc	C. C. Pemberton..	...	.....	....	....	....	19	Reported	T	E	800E	.....	......	340C	50.1
-5bac	Wendell Snyder...	50	18	GI	Hole in side............	+.5	21.32	8-10-48	T	E	1,050M	10.60	15 min	458C	88.6
-5bbb	.....do..........	47	.....	....	.....do.................	+1.0	21.69	7-29-48	T	E	1,012M	8.50	5 min	398C	74.2

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
8-15-5bcc	Wendell Snyder...	45	.....	....	Hole in side............	+1.0	20.35	8-10-48	T	E	1,031M	.....	......	228C	43.3
-5cbb	A. L. Greenamyre.	50	.....	....	.....do................	+1.0	23.00	7-29-48	T	E	1,100R	.....	......	394C	79.8
-5cbc	.....do..........	52	18	GI	.....do................	+.5	22.39	7-27-48	T	E	990M	9.06	60 hr	726C	132.2
-5dab	Burtiss..........	50	18	GI	.....do................	+.5	16.41	3-15-49	T	T	750R	.....	......	300R	41.5
-5dbc	.....do..........	60	18	GI	.....do................	+1.0	19.02	8-10-48	T	E	1,100R	.....	......	503R	101.8
-6aad	Wilber Lessinger.	...	.....	....	Hole in base............	.0	21.59	7-29-48	T	E	900R	.....	......	491C	81.4
-6aba	.....do..........	48	18	GI	.....do................	+.5	23.02	3-17-49	T	T	1,000R	.....	......	160R	29.5
-6acc	C. Yendra........	...	.....	....	.....do................	....	(a)	7-27-48	T	E	650E	.....	......	423C	50.7
-6adc	Warren Hurt......	48	.....	....	.....do................	.0	22.86	7-27-48	T	E	1,000R	.....	......	570C	105.0
-6bab	.....do..........	40	18	S	No measuring point.......	....	.....	....	T	T	700R	.....	......	......	.....
-6bdd	C. Yendra........	...	.....	....	.....do................	....	(a)	7-27-48	T	E	950E	.....	......	80R	14.0
-6ccc	Bert Post........	24	.....	....	Top of casing...........	.0	(a)	7-29-48	VC	T	125E	.....	......	144R	33.2
-6daa	Virgil Pemberton.	...	.....	....	No measuring point.......	....	.....	....	T	T	900R	.....	......	160R	26.5
-6dbc	Gustav Scheihing.	...	.....	....	.....do................	....	(a)	7-27-48	T	E	950E	.....	......	489C	85.5
-6dcc	.....do..........	45	.....	....	Edge of steel plate......	.0	14.08	7-29-48	T	T	690E	.....	......	210R	26.7
-7aab	....	50	.....	....	Hole in base............	+1.0	12.23	8- 3-48	T	T	......	.....	......	0	0
-7baa	Virgil Pemberton.	42	.....	....	.....do................	.0	13.40	7-29-48	T	T	1,000E	.....	......	160R	29.5
-7bba	.....do..........	49	.....	....	.....do................	.0	14.18	7-29-48	T	T	900E	.....	......	336R	55.7
-7bbb	Gustav Leiske....	...	.....	....	Hole in side............	+.8	13.40	3-15-49	T	T	700E	.....	......	540R	69.7
-8abb	K. Smackey.......	55	18	GI	Hole in base............	+.5	11.27	8-10-48	T	T	800E	.....	......	0	0
-8baa	.....do..........	39	.....	....	Edge of base............	+.5	13.50	7-29-48	T	E	700E	.....	......	252R	32.5
-8bab	....	...	.....	....	No measuring point.......	....	.....	....	T	T	500R	.....	......	96R	88.3
-8dbb	Ed Abood.........	...	.....	....	.....do................	....	.....	....	T	T	900R	.....	......	252R	41.7
-9abc	Fred Noltz.......	...	.....	....	.....do................	....	.....	....	T	T	1,200R	.....	......	336R	74.2
-9bbb	Ed Abood.........	...	.....	....	.....do................	....	.....	....	T	T	300R	.....	......	70R	3.9
-9bcc	.....do..........	...	.....	....	.....do................	....	.....	....	T	G	900R	.....	......	216R	35.8
-9cbc	....	...	.....	....	Edge of base............	+.5	8.82	7-29-48	T	G	700R	.....	......	192R	24.7
-10bbc	Elwood Sadd......	...	.....	....	No measuring point.......	....	.....	....	T	G	900R	.....	......	378R	62.7
-10bbd	.....do..........	...	.....	....	Hole in base............	.0	7.32	7-29-48	T	G	900R	.....	......	560R	92.9
-10bcb	.....do..........	...	.....	....	.....do................	....	.....	....	T	T	900R	.....	......	350R	58.0
-10cbc	Journey..........	...	.....	....	Top of casing...........	+1.0	6.65	8- 3-48	VC	T	400R	.....	......	40R	29.4
-11bca	A. Peterson......	39	18	GI	.....do................	+1.5	4.92	3-15-48	..	..	......	.....	......	0	0
9-13-1add	W. P. O'Brien....	63	24	C	No measuring point.......	....	.....	....	T	G	900R	.....	......	72R	11.93
-1abc	L. M. Bentley....	...	24	T	Hole in base............	+1.0	19.80	9-30-48	T	G	800R	.....	......	500R	73.6
-1ccb	Henry Wendling...	54	6	....	No measuring point.......	....	.....	....	T	G	1,000R	.....	......	216R	39.8

-1ddd	Mortimer.........	...	18	....	.....do..................	....	.....	....	T	G	1,000R	.....	......	420R	77.4
-2acc	C. W. Lewis......	60	18	....	Opening in side of pump..	.0	16.4	7-12-48	T	E	900R	.....	......	735C	122.0
-2bab	W. Smith.........	60	18	....	No measuring point.......	....	17	Reported	T	G	800R	.....	......	162R	23.8
-2cab	Woodman..........	60	.....	....	Hole in base.............	+.4	16.78	7-12-48	T	G	1,000R	.....	......	280R	51.5
-2cbb	Oliver Bros......	60	24	....	.....do..................	+.5	16.32	7-12-48	T	G	900R	.....	......	620R	102.8
-2ccb	.....do..........	59	24	....	.....do..................	+.2	15.38	7-12-48	T	G	500R	.....	......	420R	38.6
-2ccc	Kelly............	60	18	....	No measuring point.......	....	15	Reported	T	G	1,000R	.....	......	450R	82.9
-2ddb	L. W. Kilpatrick.	60	24	....	Hole in base.............	+.4	15.47	7- 8-48	T	G	1,000R	.....	......	240R	44.2
-3acb	Wm. P. Casey.....	52	24	GI	No measuring point.......	....	20	Reported	T	E	875R	.....	......	588C	94.8
-3bbc	V. L. Rosenthal..	54	24	GI	Hole in base.............	+.5	15.14	9-28-48	T	E	900R	.....	......	341C	56.5
-3cbb	H. E. Graper.....	48	22	W	No measuring point.......	....	16	Reported	HC	G	700R	.....	......	180R	23.2
-3cbd	V. L. Rosenthal..	56	24	S	Bottom of opening........	+.5	17.69	9-28-48	T	E	980R	.....	......	556C	100.5
-3cca	Raymond Swenson..	50	24	GI	Spout....................	+2.0	19.15	10- 6-48	T	G	850R	.....	......	144R	22.6
-3dca	Emory Richards...	...	24	GI	No measuring point.......	....	18	Reported	T	E	900R	.....	......	491C	81.4
-3dab	Casey Bros.......	54	24	GI	.....do..................	....	20	Reported	T	G	850R	.....	......	300R	47.0
-4abb	A. F. Stenehjem..	...	18	S	Hole in base.............	+1.0	16.61	10- 5-48	T	E	800M	.....	......	394C	58.0
-4adc	.....do..........	51	24	S	No measuring point.......	....	.....	....	T	E	......	.....	......	319C	......
-4bab	Harold W. Flory..	...	18	S	Hole in base.............	.0	17.57	9-28-48	T	E	850R	.....	......	287C	45.0
-4baa	.....do..........	60	.....	S	Edge of casing...........	.0	17.13	9-28-48	VC	G	......	.....	......	......	......
-4bbb	Harry Deboeler...	...	.....	....	Plug in base.............	.0	17.88	9-28-48	T	G	600R	.....	......	600R	66.3
-4cdd	D. E. Hayman.....	...	.....	....	Bottom edge opening......	+1.0	25.32	8-20-48	T	E	994M	.....	......	395C	72.4
-4ccb	Lyman Notter.....	46	18	S	Crack in plate...........	.0	15.55	9-28-48	T	G	800R	.....	......	600R	88.4
-4dac	H. Oliver........	58	24	....	Edge of discharge pipe...	+2.0	16.16	7-14-48	T	G	1,000R	.....	......	300R	55.2
-4ddb	Raymond Swanson..	50	18	GI	Hole in casing...........	+.5	17.75	9- 6-48	T	E	750R	.....	......	516C	71.2
-4dda	.....do..........	50	24	S	Spout....................	+3.0	19.98	9- 6-48	T	G	800R	.....	......	48R	7.07
-5aca	John Shields.....	48	.....	....	Hole in casing...........	.0	17.15	9- 5-48	T	G	700R	.....	......	600R	77.3
-5abd	T. A. Powers.....	59	18	....	Hole in base.............	.0	17.59	9- 5-48	T	G	850R	.....	......	840R	131.5
-5bbb	.....do..........	57	18	GI	Hole in casing...........	+.3	17.69	9- 5-48	T	G	......	.....	......	288R	......
-5bcb	.....do..........	...	.....	....	No measuring point.......	....	.....	....	T	E	1,050M	.....	......	265C	51.3
-5bda	F. C. Ackerman...	48	24	....	Hole in base.............	.0	17.23	9- 5-48	T	G	800R	.....	......	300R	44.2
-5cbd	Howard Widdowson.	...	24	GI	.....do..................	+.5	23.42	9- 4-48	T	E	1,000R	.....	......	472C	86.9
-5cdb	John Shields.....	60	24	GI	.....do..................	.0	17.43	9- 4-48	T	G	800R	.....	......	500R	73.7
-5cac	.....do..........	48	16	GI	.....do..................	+.5	18.36	9- 5-48	T	G	......	.....	......	500R	......
-5dac	Harold Ellis.....	60	24	GI	.....do..................	.0	17.62	9- 1-48	T	E	850R	.....	......	360R	56.3
-5dbb	Walter Cook......	50	18	GI	.....do..................	+.8	16.66	9- 1-48	T	G	800R	.....	......	130R	19.2
-5dcc	Chauncy Cook.....	50	24	GI	.....do..................	+1.0	15.05	9- 1-48	T	E	950R	.....	......	375C	65.6
-6abb	M. D. Brandt.....	61	24	....	No measuring point.......	....	.....	....	T	E	1,058M	.....	......	70C	13.63
-6acc	C. J. Furry......	...	24	GI	.....do..................	....	.....	....	T	E	900R	.....	......	282C	46.7
-6bba	T. R. Fraser.....	72	.....	....	Bottom edge of opening...	+.5	24.72	8-18-48	T	E	1,090M	14.68	......	213C	42.8
-6bbb	.....do..........	56	24	S	Edge of casing...........	.0	24.97	8-19-48	VC	G	......	.....	......	336R	......
-6bcb	Horace Kirk......	57	24	GI	Hole in base.............	.0	20.30	10- 4-48	T	E	900R	.....	......	160C	26.5
-6ccd	.....do..........	55	24	GI	.....do..................	+1.5	24.05	10- 4-48	T	E	852M	.....	......	333R	52.3
-6dbc	O. H. Pedersen...	55	24	GI	.....do..................	+1.0	20.35	10- 4-48	T	E	1,100R	.....	......	131C	26.5
-7aac	W. F. Nutter.....	61	18	GI	.....do..................	.0	22.42	10- 6-48	T	E	900R	.....	......	314C	52
-7bcd	Lloyd Loffen.....	...	18	GI	.....do..................	.0	23.87	10- 7-48	T	G	800R	.....	......	600R	88.3
-7bda	.....do..........	...	18	GI	Hole in casing...........	.0	24.16	10- 7-48	T	G	500R	.....	......	500R	46.1
-7cba	C. S. Reeds......	60	24	GI	No measuring point.......	....	22	Reported	VC	E	610M	.....	......	263C	29.6

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
9-13-7dcb	Dean Camp	...	.....	....	Hole in casing	0.0	22.13	10- 7-48	T	E	......	.....	......	199C	......
-7dbc	Wm. Farrell	62	24	GI	End of discharge pipe	+3.5	27.15	11- 1-48	T	E	1,200R	.....	......	202C	44.7
-8aad	D. H. Nutter	...	24	....	Top of casing	.0	17.88	10- 7-48	VC	G	1,000R	.....	......	100R	18.4
-8aca	.....do	...	24	GI	Hole in casing	+1.0	17.45	10- 7-48	T	E	750R	.....	......	394C	54.4
-8acb	.....do	...	24	GI	Motor brace E side	+.5	18.65	10- 7-48	VC	E	450R	.....	......	125C	10.38
-8bbb	.....do	57	18	GI	N side of casing	.0	18.70	10- 6-48	T	E	697M	11.86	......	414C	53.2
-8bcc	.....do	50	24	....	Land surface	.0	18.79	10- 5-48	VC	E	900R	.....	......	68C	11.28
-8cca	Gus George	50	24	GI	Hole in base	.0	19.81	10- 1-48	T	E	800R	.....	......	732C	108.0
-8ccc	Harris Bros	54	18	....	.....do	+1.0	19.12	11- 1-48	T	E	1,104M	11.13	......	323C	65.7
-8dac	Gus George	50	18	GI	No measuring point	....	.....	....	T	G	700R	.....	......	120R	15.48
-8dbb	.....do	50	24	GI	Wall of casing	.0	18.02	10- 1-48	HC	G	700R	.....	......	600R	77.4
-8dcc	Harris Bros	45	14	GI	Bottom of opening	+.5	17.99	11- 1-48	T	G	800R	.....	......	238R	35.1
-9acc	Harry Oliver	60	18	....	Hole in base	+1.0	13.62	10- 8-48	T	E	500R	.....	......	222C	20.4
-9acb	.....do	58	24	....	No measuring point	....	.....	....	T	E	900R	.....	......	165C	27.4
-9bba	R. A. Stafford	...	.....	....	Bottom edge opening	+1.0	28.5	8-24-48	T	E	1,000M	10±	30 hr	157C	28.9
-9bbe	.....do	58	18	GI	Bottom of base	.0	17.28	11- 1-48	T	E	900R	.....	......	900R	148
-9ccd	H. A. Pickering	61	18	GI	Hole in base	+2.0	16.38	10- 8-48	T	E	900R	.....	......	597C	99.0
-9ccc	.....do	60	18	GI	Hole in casing	+.5	15.30	10- 8-48	T	T	850R	.....	......	375R	58.7
-9dbc	Ben F. Smith	60	24	GI	.....do	+1.5	14.30	10- 8-48	T	E	1,250R	.....	......	311C	71.7
-9ddd	.....do	59	24	SW	End of pipe	.0	19.81	10- 8-48	T	G	900R	.....	......	525R	87.0
-10abc	Oliver Bros	45	18	GI	Hole in base	+.5	17.07	11- 1-48	T	T	450R	.....	......	420R	34.8
-10acc	.....do	58	24	....	No measuring point	....	15	Reported	T	E	1,000R	.....	......	801C	147.4
-10bcd	Lloyd Mercer	60	24	....	Hole in base	+.5	15.22	7-12-48	T	E	......	.....	......	522C	.....
-10ccc	Oliver Bros	55	24	....	No measuring point	....	18	Reported	T	E	700R	.....	......	572C	73.7
-10ccc	.....do	58	18	....	.....do	....	18	Reported	T	E	900R	.....	......	592C	98.1
-10dbc	Harold Conroy	55	24	....	Hole in base	.0	18	Reported	T	E	1,000R	.....	......	498C	91.7
-10ddb	Frank Stibor	60	24	....	No measuring point	....	18	Reported	T	E	900R	.....	......	101C	16.75
-11acc	Oliver Pierce	65	18	....	Bottom of base	....	.....	7- 8-48	T	E	900R	.....	......	988R	164
-11bbc	Geo. Waddington	50	24	....	.....do	+.4	15.02	7- 9-48	T	NG	885M	33.23	......	840R	139
-11bcc	.....do	50	10	....	Edge of plank base	.0	13.68	7- 9-48	T	NG	1,200R	.....	......	552R	122
-11cbd	Shelton Academy	60	24	....	No measuring point	....	16	Reported	T	NG	850R	.....	......	456R	71.4
-11ccb	L. W. Kilpatrick	...	.....	....	Hole in base	....	18.27	7-14-48	T	G	900R	.....	......	640R	106.2
-11cda	Lester Stibor	60	24	....	.....do	+.1	18.33	7- 9-48	T	E	950R	.....	......	522C	91.3
-11ddc	Walter Lewis	...	24	....	.....do	.0	16.77	7- 7-48	T	E	1,000R	.....	......	654C	120.4
-12aad	Mortimer	60	18	....	.....do	+.5	20.56	8-27-48	T	NG	......	.....	......	800R	.....

-12abb	Verne Rima.......	60	24	....	Crack in base...........	.0	19.4	7- 6-48	T	G	900R	.....	......	50R	8.28
-12acb	.....do..........	...	72	W	Hole in base............	+.5	22.12	10-12-48	T	E	1,100R	.....	......	680C	138
-12bac	.....do..........	58	18	....	.....do.................	+.5	24.35	7- 6-48	T	E	1,000R	.....	......	434C	80
-12bcc	Raymond Watson...	...	24	GI	.....do.................	+2.0	19.44	10-12-48	T	T	850R	.....	......	450R	70.4
-12bcd	Verne Rima.......	55	18	....	.....do.................	+.5	20.4	7- 6-48	T	E	1,000R	.....	......	720R	......
-12cbc	Henry Wendling...	56	24	....	.....do.................	+.5	15.68	7- 7-48	T	E	1,124M	.....	......	608C	126
-12dab	Floyd Smith......	59	24	....	.....do.................	.0	15.59	7- 6-48	T	T	800R	.....	......	485R	71.5
-12dbc	.....do..........	60	14	....	.....do.................	.0	16.48	7- 7-48	T	G	1,000R	.....	......	360R	66.3
-12ccb	Eli Schroder.....	60	6	....	No measuring point.......	....	17	Reported	T	E	500R	.....	......	487C	44.8
-13abb	Haydenfelt.......	60	24	GI	Hole in base............	.0	18.40	7- 7-48	T	T	900R	.....	......	390R	64.7
-13acb	Clarence Ellis...	46	24	....	Top of plank............	.0	4.51	7- 7-48	VC	T	750R	.....	......	84R	11.6
-13bbb	Thurl Resh.......	60	24	....	No measuring point.......	.0	17	Reported	T	E	725M	.....	......	697C	93.1
-13bca	Henry Urich......	60	24	....	.....do.................	.0	17	Reported	T	T	950R	.....	......	250R	43.7
-13dbc	Clarence Ellis ..	50	24	....	.....do.................	.0	5	Reported	VC	T	750R	.....	......	......	......
-14aac	H. Wendling......	49	18	....	Hole in base............	+.5	16.32	7- 7-48	T	T	1,000R	.....	......	738R	69.6
-14acb	Roy Schroeder....	57	18	GI	.....do.................	+1.5	18.99	10-28-48	T	NG	1,200R	.....	......	1,000R	220.9
-14acc	.....do..........	59	24	GI	.....do.................	+1.0	17.64	10-28-48	T	NG	900R	.....	......	500R	82.8
-14bbb	Walter Lewis.....	60	24	....	No measuring point.......	....	18	Reported	T	E	1,028M	17.63	......	782C	148
-14bdc	.....do..........	...	24	....	.....do.................	....	18	Reported	T	NG	850R	.....	......	816R	127.8
-14cbc	G. W. Wellensick.	61	18	....	.....do.................	....	18	Reported	T	E	977M	16±	......	779C	140.8
-14ccb	Art Holmburg.....	54	18	....	Top of casing...........	+1.0	18.17	7-15-48	..	..	......	.....	......	......	......
-15aac	Dale Stubblefield	52	24	C	.....do.................	.0	15.1	6-16-48	T	E	700R	.....	......	614C	79.2
-15abb	Harry Oliver.....	60	24	....	Hole in base............	+2.0	17.34	6-25-48	T	E	800R	.....	......	406C	59.8
-15bbc	Harold Conroy....	55	24	S	No measuring point.......	....	18	Reported	T	T	800R	.....	......	......	......
-15bbd	.....do..........	55	18	GI	Hole in base............	+3.0	18	Reported	T	E	900R	.....	......	702C	116.5
-15bcc	W. E. Oliver.....	57	24	GI	.....do.................	+2.0	17	Reported	T	E	900R	.....	......	322C	53.4
-15cbb	Harris Bros......	58	24	GI	.....do.................	+1.0	19.53	11- 2-48	T	E	1,100R	.....	......	205C	41.5
-15cdb	.....do..........	58	18	GI	.....do.................	+.5	17.78	11- 2-48	T	E	1,100R	.....	......	237C	48
-15dbc	Dale Stubblefield	55	24	S	No measuring point.......	....	18	Reported	T	T	900R	.....	......	525R	87
-15dca1	.....do..........	55	24	S	Hole in base............	.0	18.29	6-15-48	T	E	950R	.....	......	367C	64.2
-15dca2	.....do..........	55	60	T	Edge of casing..........	+2.0	18.95	6-15-48	VC	T	......	.....	......	0	......
-16abc	Harris Bros......	53	18	S	Hole in base............	+.5	16.56	9-29-48	T	T	600R	.....	......	135R	14.92
-16acc	W. E. Oliver.....	62	24	GI	.....do.................	+.5	16.65	9-29-48	T	E	800R	.....	......	515C	75.9
-16cbb1	Frank Smith......	50	18	GI	.....do.................	+.5	17.30	11- 2-48	T	E	896M	.....	......	395R	65.2
-16cbb2	Pete Sommers.....	48	24	GI	.....do.................	+.6	17.22	11- 2-48	T	E	1,000R	.....	......	675R	124
-16cca	.....do..........	50	24	GI	.....do.................	+.5	17.10	10-28-48	T	E	900R	.....	......	112C	18.6
-16dbb1	.....do..........	50	24	GI	.....do.................	.0	16.31	11- 2-48	T	E	800R	.....	......	127C	18.7
-16dbb2	.....do..........	49	24	GI	.....do.................	.0	16.65	9-29-48	T	E	1,000R	.....	......	798C	147
-17abc	Lyman Nutter.....	54	28	W	Top of casing...........	.0	17.69	9-29-48	T	E	700R	.....	......	344C	44.4
-17acc	.....do..........	60	18	I	Hole in floor...........	+.5	17.26	9-29-48	T	E	1,000R	.....	......	506C	93.2
-17bbc1	N. Wensel........	60	24	S	No measuring point.......	.0	18.60	Reported	T	NG	756M	.....	......	360R	39.8
-17bbc2	.....do..........	60	24	GI	Hole in base............	+.2	20.42	8- 3-48	T	T	900R	.....	......	275R	45.6
-17bcc	Garnet Rose......	58	24	GI	.....do.................	+.2	17.97	8- 3-48	T	T	......	.....	......	......	......
-17cbb	Pete Sommers.....	60	18	GI	.....do.................	+.5	17	Reported	T	E	1,000R	.....	......	677C	123.5
-17ccc	.....do..........	54	24	GI	.....do.................	+2.0	16.99	9-29-48	T	E	994M	19.11	......	572C	104.8
-17ddc	C. D. Wenner.....	50	36	S	Top of casing...........	.0	17.59	9-29-48	T	T	......	.....	......	250R	......
-18aaa	N. Wensel........	65	...	I	No measuring point.......	....	18	Reported	VC	T	......	.....	......	50R	......
-18aca	.....do..........	60	24	S	.....do.................	....	18	Reported	T	NG	1,120M	.....	......	288R	53

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
9-13-18bbb	McConnell Bros...	57	24	S	No measuring point.......	....	18	Reported	T	NG	1,120M	.....	......	288R	53
-18ccc	Carl Swedlund....	60	24	GI	Hole in base.............	....	15.19	10- 1-48	VC	T	900R	.....	......	540R	89.4
-18dac	H. Lippencott....	58	24	S	No measuring point........	....	16	Reported	T	T	850R	.....	......	210R	32.9
-18dbb	.....do..........	57	24	S	....	....	17	Reported	T	T	900R	.....	......	210R	34.8
-18ddb	John Barrens.....	56	60	S,W	Top edge of plank........	....	16.67	8- 9-48	VC	T	600R	.....	......	120R	13.28
-19adc	Leo Wyman........	58	24	S,W	No measuring point.......	....	16	Reported	VC	T	600R	.....	......	180R	19.9
-19bbb	C. W. Leonard....	57	72	C,S	Top of casing............	....	10.61	8- 9-48	VC	T	900R	.....	......	0	0
-19bcb	Sam Bretz........	60	18	GI	Hole in base.............	0.0	12.43	10-13-48	T	T	900R	.....	......	450R	74.5
-19bda	.....do..........	60	24	GI	Top of cover.............	.0	14.27	10-13-48	VC	T	700R	.....	......	450R	58.0
-19cac	Wm. Faber........	56	24	.....	Top of base..............	+.3	12.15	8-13-48	VC	T	650R	.....	......	735R	88.0
-19cbb	John Barrens.....	57	24	.....	Top of plank cover.......	.0	11.46	8-13-48	VC	T	......	.....	......	0	0
-19dcc	R. F. Snyder.....	42	24	GI	No measuring point.......	....	.....	....	T	E	750M	.....	......	157C	21.7
-20abc	Harry Donaldson..	60	24	GI	Hole in base.............	+.3	14.69	8-10-48	T	E	900R	.....	......	289C	47.9
-20bba	Erwin H. Blue....	57	18	C	Top of pit curb..........	.0	14.42	8-10-48	VC	T	850R	.....	......	252R	35.2
-20bbd	.....do..........	57	18	GI	Hole in base.............	.0	14.50	8-10-48	T	E	900R	.....	......	401C	66.5
-20cba	Frank Pitke......	60	24	GI	Top of I beam............	+.3	15.59	8-13-48	VC	T	600R	.....	......	735R	87.9
-20dba	Wilkie Bros......	62	24	GI	Hole in base.............	+.5	12.45	9-30-48	T	E	1,200R	.....	......	77C	17.0
-20dca	.....do..........	62	24	GI	.....do..................	.0	9.48	9-30-48	T	E	1,200R	.....	......	141C	31.2
-21aab	Pete Sommers.....	66	24	GI	.....do..................	.0	16.30	9-29-48	T	E	650R	.....	......	530C	63.5
-21acb	.....do..........	58	24	GI	.....do..................	.0	15.02	9-30-48	T	E	750R	.....	......	575C	79.5
-21bbb	C. D. Wenner.....	57	24	GI	Top of casing............	+.5	16.87	9-30-48	T	T	800R	.....	......	600R	88.4
-21bcb	Alvah Zimmerman..	46	24	GI	Hole in base.............	+.5	15.66	9-30-48	T	T	850R	.....	......	200R	31.3
-21cbd	Irl Zimmerman....	50	24	W,GI	Top edge of pit..........	.0	12.33	9-30-48	HC	E	500R	.....	......	5C	4.61
-21dbb	A. Castaneda.....	55	18	GI	Hole in base.............	.0	12.61	10-13-48	T	T	1,200R	.....	......	600R	132.6
-21dda	.....do..........	55	18	GI	.....do..................	.0	13.70	10-13-48	T	T	1,200R	.....	......	600R	132.6
-22aac	Max Wilkie.......	...	.....	....	No measuring point.......	....	15	Reported	T	E	......	.....	......	272C	......
-22bac	Art Holmburg.....	54	18	....	Opening in side of turbine	+.6	14.45	7-15-48	T	E	900R	.....	......	560C	92.8
-22bca	D. Stubblefield..	55	24	GI	No measuring point.......	....	.....	....	T	T	900R	.....	......	210R	34.8
-22bcb	.....do..........	60	.....	W	.....do..................	....	13	Reported	T	T	900R	.....	......	540R	32.6
-22bcc	O. O. Hayman.....	...	.....	....	Edge of discharge pipe...	.0	12.14	10-14-48	HC	T	......	.....	......	......	......
-22ccb	Chas. Sealing....	...	18	W	Top of small pipe........	.0	12.95	10-13-48	T	T	1,000R	.....	......	360R	66.3
-22cd	.....do..........	44	24	GI	Hole in side of turbine..	.0	6.58	10-13-48	T	T	1,000R	.....	......	540R	99.4
-22dbb1	.....do..........	50	18	S	Hole in casing...........	+1.0	8.18	10-13-48	T	T	1,000R	.....	......	96R	17.7
-22dbb2	.....do..........	50	18	GI	Hole in base.............	.0	7.56	10-13-48	T	T	1,000R	.....	......	225R	41.4

-24adb	Ralph Ruether....	52	18	S	End of discharge.........	+3.6	13.64	7- 2-48	T	T	1,000R	.....	......	720R	132.8
-24cad	Chas. M. Helser..	48	72	T	Top of casing............	+.5	6.03	10-11-48	VC	T	......	.....	......	0	0
-24cbd	Verne Rima.......	55	24	GI	.....do..................	+1.0	8.19	10-11-48	T	T	1,000R	.....	......	48R	8.84
-24dbb	Chas. M. Helser..	50	24	S	Hole in base.............	+.5	7.17	10-11-48	T	T	1,000R	.....	......	0	0
-24dbc	.....do..........	40	60	W	Top of plank.............	.0	5.45	7- 2-48	HC	T	700R	.....	......	0	0
-25abc	Allen Howe.......	38	18	GI	Top of casing............	.0	3.63	10-11-48	..	..	......	.....	......	0	0
-25acc	.....do..........	42	24	GI	Hole in casing...........	+.6	4.60	10-11-48	T	T	1,000R	.....	......	600R	110.5
-25bb	E. Colburn.......	40	24	GI	Top of casing............	+1.0	7.51	10-11-48	T	T	700R	.....	......	1,080R	139.2
-25bcb	Roy M. Jacobs....	52	26	W	End of discharge pipe....	+3.0	7.60	10-11-48	T	T	1,000R	.....	......	300R	55.2
-26aca	D. Stubblefield..	40	24	W	Top of casing............	-6.0	1.65	10-12-48	HC	T	900R	.....	......	450R	74.5
-26daa	.....do..........	40	24	W	.....do..................	-6.0	.62	10-12-48	HC	T	650R	.....	......	300R	35.9
-26dbb	S. W. Glazier....	...	.....	GI	Hole in casing...........	-7.0	1.14	10-12-48	HC	T	900R	.....	......	140R	23.2
-26dcd	.....do..........	...	.....	....	Top edge of pit..........	.0	7.60	10-12-48	HC	T	900R	.....	......	700R	116.0
-27bca	Herbert Koreak...	45	60	GI	Top of casing............	.0	6.54	10-18-48	HC	T	850R	.....	......	180R	28.2
-27bdc	.....do..........	45	24	GI	.....do..................	-3.5	4.02	10-18-48	HC	T	750R	.....	......	270R	37.3
-27cbb	Glen Hempleman...	35	18	GI	.....do..................	+1.5	6.66	10-18-48	HC	T	600R	.....	......	140R	15.48
-28abd	Herbert Koreak...	40	18	GI	Hole in base.............	.0	6.12	10-18-48	T	T	850R	.....	......	150R	23.5
-28acb	C. E. Herter.....	48	14	GI	Top of casing............	-3.0	5.42	10-18-48	HC	T	800R	.....	......	525R	77.4
-28cbb	V. E. Snyder.....	40	14	GI	.....do..................	.0	5.88	10-18-48	..	..	......	.....	......	0	0
-28ccb	.....do..........	45	14	GI	.....do..................	+.5	4.98	10-18-48	..	..	......	.....	......	0	0
-29aac	W. J. Donaldson..	...	18	....	....	....	.....	....	..	..	......	.....	......	0	0
-29abb	.....do..........	45	18	GI	Top of casing............	.0	6.76	10-15-48	HC	T	600R	.....	......	375R	41.4
-29acb	.....do..........	50	14	GI	.....do..................	+.5	6.14	10-15-48	HC	T	650R	.....	......	375R	44.8
-29bbb	H. L. Clark......	50	18	GI	Hole in turbine..........	+.5	7.42	10-15-48	T	E	......	.....	......	105C	......
-29bc	.....do..........	50	24	GI	Top of casing............	+.5	5.48	10-15-48	T	T	......	.....	......	480R	......
-29dac	V. E. Snyder.....	45	24	GI	.....do..................	+.5	5.62	10-18-48	HC	T	800R	.....	......	135R	19.8
-29dbb	.....do..........	45	24	GI	Hole in base.............	.0	6.02	10-15-48	T	E	1,200R	.....	......	249C	55.0
-30abb	W. S. Donaldson..	45	24	GI	.....do..................	.0	7.49	10-14-48	T	T	900R	.....	......	1,170R	194.0
-30bba	Art Carpenter....	...	.....	....	Top of casing............	.0	11.17	10-14-48	T	T	1,000R	.....	......	......	......
-30bbb	.....do..........	56	24	GI	No measuring point.......	.0	11	Reported	T	T	800R	.....	......	394R	58.0
-30bbc	.....do..........	42	24	GI	Top of casing............	.0	7.03	10-14-48	T	T	600R	.....	......	300R	33.2
-30cbb	.....do..........	40	24	GI	Hole in base.............	.0	5.56	10-14-48	VC	T	1,500R	.....	......	216R	59.6
-30cbc	.....do..........	41	24	GI	Top of casing............	+.5	5.38	10-14-48	VC	T	......	.....	......	......	......
-30ccc	.....do..........	40	24	GI	.....do..................	+.5	5.34	10-14-48	VC	T	800R	.....	......	480R	70.6
-30dac	M. E. Clevenger..	55	24	GI	End of discharge pipe....	+3.5	8.10	10-15-48	T	T	900R	.....	......	375R	62.1
-30dbb	.....do..........	51	24	....	Top of casing............	.0	5.18	10-14-48	VC	T	650R	.....	......	375R	44.8
-30dcc	.....do..........	50	18	GI	No measuring point.......	....	.....	....	VC	T	600R	.....	......	375R	41.4
-31bad	B. E. Dubbs......	45	18	GI	Top of casing............	.0	6.56	10-26-48	VC	T	700R	.....	......	48R	6.2
-31bbb	P. E. Masser.....	40	24	GI	.....do..................	.0	5.48	10-26-48	VC	T	700R	.....	......	280R	36.1
-31bcb	.....do..........	38	18	GI	.....do..................	.0	4.65	10-26-48	..	..	......	.....	......	0	0
-31cda	F. B. Herter.....	50	18	GI	Top edge of pit..........	.0	8.30	10-26-48	VC	T	800R	.....	......	840R	123.8
-31cdb	Murray Gorceny...	40	18	GI	No measuring point.......	.0	7	Reported	T	T	800R	.....	......	120R	17.7
-32cca	Ben Wilson.......	35	18	GI	Top of casing............	.0	7.64	10-26-48	VC	T	900R	.....	......	360R	59.6
-32cdb	H. H. Winchester.	30	.....	....	No measuring point.......	....	7	Reported	VC	T	300R	.....	......	225R	12.45
-32dca	Ben Wilson.......	35	18	GI	Top of casing lid........	.0	6.18	10-26-48	VC	T	900R	.....	......	240R	39.8
-33abb	W. E. Oliver.....	30	18	GI	Hole in base.............	+.5	7.72	11- 3-48	T	G	900R	.....	......	240R	39.8
-33baa	Raymond Oliver...	40	5	T	Top of flange............	-.5	5.12	11- 3-48	VC	T	......	.....	......	0	0
-33bcb	W. E. Oliver.....	65	18	GI	Top of casing............	.0	6.27	11- 3-48	T	T	600R	.....	......	80R	8.84

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
9-14-1bbb	M. D. Brandt.....	67	24	....	Hole in base............	0.0	32.64	7-27-48	T	T	800R	.....	......	182R	26.6
-1bcb	.....do..........	...	18	....	No measuring point.......	....	.....	....	T	E	845M	.....	......	301C	46.8
-2aaa	Tony Estermann...	68	24	....	Hole in base............	+.5	33.70	7-27-48	T	T	900R	.....	......	320R	53
-2acc	Bruce Randall....	60	18	....	No measuring point.......	....	.....	....	T	T	700R	.....	......	675R	87
-2bba	Walter Bennett...	70	18	....	Opening in side of turbine	+.5	29.96	7-29-48	T	E	715M	13.54	......	474C	62.5
-2bcb	.....do..........	58	24	....	Top of steel frame.......	.0	23.61	8- 4-48	T	T	650R	.....	......	420R	50.4
-2cca	Luther Donalson..	60	18	....	No measuring point.......	....	.....	....	T	T	850R	.....	......	280R	43.8
-2ddd	E. Knudsen.......	58	24	....	Top of turbine base......	.0	23.47	7-29-48	T	T	750R	.....	......	450R	62.2
-2dcb	.....do..........	65	18	....	....	....	.....	....	T	E	900R	.....	......	522C	86.5
-3abb	Glen DeBruler....	66	.....	....	Hole in base............	.0	a54.80	8-18-48	T	E	466M	.....	......	291C	25
-3acb	Evan Lacrow......	69	18	....	....	....	.....	....	T	E	800R	.....	......	337C	49.7
-3bab	O. H. Pederson...	70	18	....	Hole in base............	+1.0	35.15	8- 4-48	T	E	500R	.....	......	858C	79
-3bca	H. C. Scott......	68	18	....	....	....	.....	....	T	E	700R	.....	......	276C	35.6
-3bda	.....do..........	62	18	....	....	....	.....	....	T	T	500R	.....	......	105R	9.67
-3dbb	Ray Francis......	71	24	....	....	....	.....	....	T	T	1,000R	.....	......	480R	88.4
-4aad	O. H. Pederson...	70	18	....	....	....	.....	....	T	E	700R	.....	......	91C	11.7
-4daa	Clifford Giddings	60	72-18	....	No measuring point.......	....	.....	....	T	E	600R	.....	......	572C	63.2
-4dcc	Clyde Canaday....	65	18	....	.....do..................	....	.....	....	T	E	700R	.....	......	219C	28.2
-5cbc	Glen Covert......	...	18	....	Opening in side of turbine	+1.0	22.97	8- 2-48	T	E	658M	.....	......	......	......
-5ddb	Roy Griffen......	60	18	....	....	....	.....	....	T	T	450R	.....	......	360R	29.8
-6ca	Clyde Canaday....	67	.....	....	....	....	.....	....	T	E	300R	.....	......	669C	36.9
-6dac	Ed Plunkett......	70	18	....	....	....	.....	....	T	T	400R	.....	......	630R	46.4
-6db	.....do..........	70	18	....	....	....	.....	....	T	T	400R	.....	......	......	......
-7acd	R. T. Rogers.....	63	18	....	....	....	.....	....	T	E	850R	.....	......	315C	49.3
-7bcc	.....do..........	70	18	....	No measuring point.......	....	.....	....	T	E	725M	.....	......	186C	24.8
-7cbc	.....do..........	59	24	....	.....do..................	....	.....	....	T	T	1,000R	.....	......	420R	77.4
-7ccc	.....do..........	60	18	....	.....do..................	....	.....	....	T	E	563M	.....	......	455C	47.2
-7dbc	John Miller......	75	18	....	....	....	.....	....	T	E	650R	.....	......	305C	36.6
-8aac	Clyde Canaday....	65	18	....	....	....	.....	....	T	T	700R	.....	......	......	......
-8bcc	Roy Griffen......	57	24	....	Hole in base............	+.5	21.74	8- 2-48	T	E	1,000R	.....	......	104C	19.2
-8bdc	R. T. Rogers.....	60	18	....	....	....	.....	....	T	T	1,000R	.....	......	420R	47.4
-8dca	.....do..........	60	18	....	No measuring point.......	....	.....	....	T	T	400R	.....	......	120R	8.85
-8dcb	.....do..........	58	18	....	....	....	.....	....	T	T	950R	.....	......	360R	62.9
-9ada	Ed Anderson......	63	18	....	....	....	.....	....	T	E	650R	.....	......	374C	44.8

-9baa	R. L. Spencer....	66	18	....	Hole in base..........	+1.0	23.50	8-17-48	T	E	850R	.....	......	......	......
-9bbb	Henry Moss.......	67	18	....	....	....	.....	....	T	E	600M	.....	......	226C	25
-9cb	Leo Erpelding....	65	.....	....	....	....	21	Reported	T	E	900R	.....	......	241C	40
-9ccc	.....do..........	60	18	....	....	....	21	Reported	T	E	750R	.....	......	259C	35.8
-9dac	Howard Mercer....	55	24	....	....	....	21	....	T	E	1,000R	.....	......	1,080R	......
-9dbc	Leo Erpelding....	65	18	....	....	....	21	Reported	T	T	900R	.....	......	675R	112
-9dcb	.....do..........	...	18	....	....	....	21	Reported	VC	T	900R	.....	......	540R	89.5
-9ddb	Howard Mercer....	65	.....	....	....	....	.....	....	T	E	1,000R	.....	......	1,080R	......
-10bab	C. W. Anderson...	65	.....	....	....	....	.....	....	VC	T	600R	.....	......	240R	26.5
-10bcb	Walter Frink.....	65	18	....	....	....	.....	....	T	E	800R	.....	......	262C	38.6
-10ca	H. Mercer........	64	.....	....	....	....	.....	....	..	T	800R	.....	......	600C	88.4
-10ccb	....	...	18	....	Hole in base..........	.0	22.99	7-30-48	T	E	900E	.....	......	......	......
-10db	C. W. Anderson...	67	.....	....	....	....	.....	....	T	T	700R	.....	......	240R	30.9
-10ddc	V. Zavala........	63	24	....	Opening in side of tur-bine	+.5	26.67	7-30-48	T	E	800E	.....	......	661C	97.4
-11abc	Henry Moss.......	58	24	....	....	....	.....	....	T	E	800E	.....	......	155C	22.8
-11acb	Frank Richardson.	...	.....	....	....	....	.....	....	T	E	800E	.....	......	......	......
-11bcb	M. F. Edwards....	64	24	....	Opening in side of tur-bine	+1.5	23.87	7-29-48	T	E	875E	.....	......	477C	76.9
-11bcc	.....do..........	67	.....	....	No measuring point.......	....	.....	....	T	T	1,000R	.....	......	120R	22.1
-11cbc	Harold Clark.....	61	18	....	Opening in side of tur-bine	+1.0	27.17	7-28-48	T	E	1,072M	10.08	......	306C	60.4
-11ccb	....	59	72	....	Top of cross-beam........	+.5	26.54	7-29-48	T	E	900R	.....	......	......	......
-11dbb	Frank Richardson.	65	18	....	....	....	.....	....	T	T	900R	.....	......	......	......
-11dca	Mark Bolin.......	64	.....	....	....	....	.....	....	T	E	1,100R	.....	......	634C	128.5
-12abc	Jim Winchester...	57	24	....	Hole in base..........	....	.....	....	T	T	800R	.....	......	420R	61.8
-12bbc	John Ross........	...	.....	....	....	....	.....	....	T	E	1,000E	.....	......	25C	5.06
-12bbd	W. J. Larington..	60	18	....	Hole in base..........	....	.....	....	T	E	900R	.....	......	328C	54.3
-12caa	John Ross........	...	.....	....	....	....	.....	....	T	E	900E	.....	......	391C	64.8
-12dbb	.....do..........	...	.....	....	....	....	.....	....	..	..	......	.....	......	......	......
-13bbb	....	...	.....	....	....	....	.....	....	..	..	......	.....	......	......	......
-14bbd	Harlan Kiefer....	65	.....	....	....	....	.....	....	T	E	900E	.....	......	520C	86.2
-14cad	E. D. Schroeder..	52	18	....	No measuring point.......	....	.....	....	T	T	1,200R	.....	......	560R	124
-15bcc	Mark Bolin.......	63	18	....	Top edge of base.........	.0	22.88	8- 3-48	T	T	900R	.....	......	......	......
-15ccc	Lester Deets.....	65	24	....	Hole in base..........	.0	26.17	8- 3-48	T	E	800R	.....	......	438C	64.5
-16add	Howard Mercer....	66	18	....	No measuring point.......	....	.....	....	T	T	1,050R	.....	......	90R	17.4
-16bcb	Weaver Lunger....	63	18	....	Opening in side of tur-bine	+.5	22.59	8- 5-48	T	T	1,200R	.....	......	280R	62
-16cbc	Lloyd Sickler....	60	18	....	.....do..........	+.5	15.96	8- 5-48	T	T	1,200R	.....	......	1,120R	248
-16ccd	.....do..........	60	18	....	.....do..........	....	.....	....	T	G	1,200R	.....	......	1,120R	248
-16dad	Howard Mercer....	70	18	....	.....do..........	+1.0	29.23	8- 3-48	T	E	906M	9.89	.5 hr	357C	59.5
-17bbb	John Miller......	75	24	....	No measuring point.......	....	.....	....	T	T	600E	.....	......	96R	10.6
-17cbc	Earl Hammans.....	58	18	....	Opening in side of tur-bine	+1.0	31.28	8-28-48	T	E	954M	.....	......	257C	4.39
-17dbb	.....do..........	65	18	....	.....do..........	+1.0	28.16	8-31-48	T	E	600R	.....	......	412C	45.5
-18abb	R. T. Rogers.....	60	18	....	....	....	.....	....	T	T	850R	.....	......	360R	56.3
-18acb	.....do..........	50	18	....	....	....	.....	....	VC	T	750R	.....	......	240R	33.2
-18adc	.....do..........	50	18	....	....	....	.....	....	T	T	550R	.....	......	120R	12.15
-18ccb	Keith Rayburn....	60	18	....	....	....	.....	....	T	E	1,200R	.....	......	706C	156
-18ddc	J. L. Hammonds...	63	.....	....	No measuring point.......	....	.....	....	T	T	800R	.....	......	1,000R	147.5
-19acb	A. W. Bendtfeldt.	51	18	....	....	....	.....	....	T	E	800R	.....	......	1,292C	190.3
-19add	.....do..........	60	18	....	....	....	.....	....	T	E	1,100R	.....	......	338C	182
-19bbc	.....do..........	60	18	....	Opening in side of tur-bine	+.5	25.32	8- 2-48	T	E	1,000M	15.13	......	900C	165.5

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point		Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown		1947 pumpage	
					Description	Distance above (+) or below (-) surface						Amount (feet)	Duration of test	Hours of operation	Total number of acre-feet pumped
					Buffalo County--Continued										
9-14-19cb	Del Lewis........	56	24	....	Top edge of base.........	+0.5	26.80	8- 2-48	T	T	850R	.....	......	540R	84.5
-19dcb	Robert Lewis.....	72	18	....	....	....	.....	....	T	E	1,000R	.....	......	258C	47.4
-19dcd	.....do..........	70	24	....	....	....	.....	....	T	T	500R	.....	......	480R	44.2
-20abc	A. W. Bendfeldt..	62	18	....	....	....	.....	....	T	T	900R	.....	......	600R	99.5
-20dcb	Verl Deets.......	50	18	....	....	....	.....	....	T	E	850R	.....	......	790C	123.7
-21bbc	Griffen..........	...	18	....	Hole in base.............	+.5	20.88	8- 5-48	T	T	......	.....	......	......	......
-21bcb	Verl Deets.......	...	18	....	.....do..................	+.5	19.78	8- 5-48	VC	T	600R	11.75	10 min	120R	13.3
-21ccb	.....do..........	63	18	....	....	....	.....	....	T	E	878M	.....	......	660C	106.8
-22bbb	S. M. Doty.......	63	18	....	Hole in base.............	.0	17.18	8- 3-48	T	E	950R	.....	......	..336C	58.8
-22bcb	Ray Francis......	52	24	....	Opening in side of turbine	+.5	a31.95	8-11-48	T	E	937M	.....	......	193C	33.3
-22cbb	Oscar Clark......	65	18	....	.....do..................	+1.0	14.06	8- 9-48	T	E	954R	17.91	......	256C	45
-22ccc	.....do..........	60	24	....	....	....	.....	....	T	E	1,000E	.....	......	1,228C	226
-22dbc	Clyde Mawhinney..	60	.....	....	....	....	.....	....	T	T	900R	.....	......	30R	4.97
-22dcb	.....do..........	60	24	....	....	....	.....	....	T	E	1,200R	.....	......	363C	80.2
-23dbb	Keith Rayburn....	57	18	....	....	....	.....	....	T	E	1,000R	.....	......	260C	47.8
-24ba	Ray Francis......	63	18	....	....	....	.....	....	T	T	950R	.....	......	360R	63
-24bbb	Garnet Rose......	50	18	....	....	....	.....	....	T	G	900R	.....	......	210R	34.8
-25abb	Earl Johnson.....	50	18	....	....	....	.....	....	T	T	850R	.....	......	525R	82.2
-25abc	.....do..........	54	18	....	Hole in base.............	+.5	a40.76	9- 1-48	T	E	1,043M	.....	......	416C	79.7
-25bba	Tom Ice..........	59	24	....	....	....	.....	....	T	E	1,000R	.....	......	374C	69
-25bbb	.....do..........	36	24	....	....	....	.....	....	T	E	625M	.....	......	490C	56.4
-26acb	G. C. Schambaugh.	40	24	....	....	....	.....	....	T	E	1,000R	.....	......	380C	70
-26adb	Howard Furgeson..	48	24	....	Hole in base.............	.0	13.02	8-13-48	T	T	1,000R	.....	......	480R	88.4
-26bbc	Ray Francis......	...	.....	....	....	....	.....	....	T	E	1,250R	.....	......	759C	175
-26bcc	.....do..........	57	18	....	....	....	.....	....	T	E	500R	.....	......	155C	14.3
-26bcd	George Bailey....	60	18	....	Hole in base.............	+.5	.....	....	T	E	900R	.....	......	625C	103.5
-26cbb	E. M. Applegate..	59	18	....	.....do..................	+.5	13.06	8-12-48	T	E	878M	9.00	......	375C	60.7
-26cbc	.....do..........	60	18	....	.....do..................	.0	10.97	8-12-48	T	T	600R	.....	......	168R	18.6
-26dbb	Tom Ice..........	56	120	C	.....do..................	.0	.....	....	HC	E	600R	.....	......	168R	18.6
-27abb	Clyde Bailey.....	60	18	....	.....do..................	.0	.....	....	T	T	1,000R	.....	......	168R	31
-27acb	.....do..........	47	24	....	Opening in side of turbine	+1.0	12.58	8-11-48	T	E	900R	.....	......	844C	140
-27adb	George Bailey....	60	18	....	....	....	.....	....	T	T	900R	.....	......	720R	119.5
-27bba	Wm. Schmidt......	...	18	....	Opening in side of turbine	+1.0	14.11	8- 9-48	T	E	800R	.....	......	173C	25.5
-27bbd	A. F. Stenehjem..	50	18	....	.....do..................	+1.0	15.69	8- 4-48	T	E	1,477M	9.12	......	1,200R	......

-27cbb	.....do..........	50	18	....	.....do..................	+.5	14.37	8- 4-48	T	E	1,000R	.....	......	1,200R	......
-27cca	Wayne Mawhinney..	67	18	....	.....do..................	+1.0	13.80	8- 4-48	T	E	1,311M	12.95	......	536C	129
-27ccc	C. Betebenner....	60	18	....	Hole in base.............	+.5	13.40	8- 4-48	T	E	1,200R	.....	......	290C	64
-27dbc	Max Applegate....	66	18	....	.....do..................	+.5	12.06	8-11-48	T	E	1,250R	.....	......	209C	48.1
-27dcb	.....do..........	40	24	....	.....do..................	+.5	12.65	8-11-48	T	E	1,250R	.....	......	237C	54.6
-28aac	Mark Bolin.......	60	18	....	No measuring point.......	....	.....	....	T	E	908R	.....	......	477C	80.6
-28abc	D. Halkyard......	60	18	....	Hole in base.............	.0	14.73	8-11-48	T	E	1,100R	.....	......	548C	111
-28acc	.....do..........	50	24	....	....	....	.....	....	T	T	1,000R	.....	......	500R	92
-28bac	H. G. Davis......	58	24	....	Opening in side of turbine	+1.0	15.81	8-11-48	T	E	900R	.....	......	422C	69.9
-28bbb	Shields..........	...	18	....	.....do..................	+1.0	16.13	8- 6-48	T	T	850R	.....	......	420R	65.8
-28bbc	.....do..........	58	24	....	Top of steel frame.......	.0	15.73	8- 6-48	VC	T	900R	.....	......	420R	69.6
-28cbb	Mrs. Barlow......	...	72	....	Hole in base.............	+.5	15.15	8- 6-48	T	T	......	.....	......	......	......
-28ccc	.....do..........	62	.....	....	....	....	.....	....	T	E	1,000R	.....	......	......	......
-28dbc	D. Halkyard......	56	18	....	No measuring point.......	....	.....	....	T	E	937R	.....	......	600R	......
-28dcc	C. Betebenner....	60	18	....	Opening in side of turbine	+.7	14.96	8-10-48	T	E	1,300R	.....	......	567C	136
-29bbb	John Musil.......	65	.....	....	....	....	.....	....	T	T	1,000R	.....	......	525R	96.7
-29bcc	Chas. Yendra.....	60	.....	....	....	....	.....	....	T	E	1,200R	.....	......	491C	108.5
-29cbc	K. B. Gahagen....	65	18	....	Bottom of turbine base...	.0	17.21	8- 9-48	T	E	1,123M	12.77	3 hr	436C	90.1
-30aab	Fred S. Wallace..	45	18	....	....	....	.....	....	T	T	800R	.....	......	......	......
-30acb	.....do..........	60	18	....	....	....	.....	....	T	E	1,050R	.....	......	347C	67.1
-30bbd	W. E. Hendrickson	63	.....	....	....	....	.....	....	T	E	750R	.....	......	143C	19.75
-30bcb	.....do..........	62	.....	....	....	....	.....	....	T	E	900R	.....	......	437C	42.3
-30ccb	.....do..........	63	18	....	....	....	.....	....	T	E	903M	.....	......	615C	102
-31abb	Art DeBaets......	46	18	....	....	....	.....	....	T	T	800R	.....	......	1,080R	159
-31adc	.....do..........	64	72	....	No measuring point.......	....	.....	....	T	T	950R	.....	......	480R	84
-31bbb	Chas. Yendra.....	65	.....	....	....	....	.....	....	T	E	1,200R	.....	......	485C	107
-31bcb	.....do..........	60	.....	....	....	....	.....	....	T	E	1,200R	.....	......	563C	125
-31cbd	Crosscup.........	60	18	....	Opening in side of turbine	+1.0	17.53	9- 2-48	T	E	1,200E	.....	......	......	......
-31dbc	E. D. Kegler.....	40	24	....	Top of concrete base.....	.0	17.90	9- 2-48	T	E	600R	.....	......	200R	......
-32abb	H. E. Hattig.....	60	18	....	Hole in base.............	.0	15.21	8-10-48	T	T	850R	.....	......	360R	56.3
-32bbb	A. F. Gahagan....	...	18	....	Bottom of turbine base...	.0	15.09	8- 9-48	T	E	960M	9.41	......	......	......
-32bcc	Louis Erpelding..	60	24	....	No measuring point.......	....	.....	....	VC	T	600R	.....	......	200R	22.1
-32cbb	Harold Smallcomb.	45	24	....	Opening in side of turbine	+1.0	14.41	8- 9-48	T	E	1,000R	.....	......	581C	107
-32dbb	Wayne Kenton.....	60	118	....	Hole in base.............	+.5	10.71	8-10-48	T	E	1,200R	.....	......	340C	75.1
-32dc	Glen Smith.......	60	18	....	No measuring point.......	....	6	Reported	T	E	1,300R	.....	......	131C	31.4
-33abb	Wayne Kenton.....	60	18	....	....	....	.....	....	T	E	1,100R	.....	......	750C	152
-33bbb	Joe Erpelding....	30	24	....	Hole in base.............	+1.0	15.05	8- 6-48	T	E	1,288M	10.53	......	960C	228
-34abb	Wayne Mawhinney..	60	18	....	Opening in side of turbine	+1.0	10.49	8-11-48	T	T	800R	.....	......	60R	8.85
-34bbb	C. Betebenner....	46	72	....	Top of wood base.........	+.5	13.26	8- 9-48	T	E	850R	.....	......	171C	26.8
-36bbd	Howard Furgeson..	55	.....	....	Top of casing............	+.5	6.98	8-23-48	T	T	750R	.....	......	240R	33.2
9-15-1cca	Oliver Linblom...	61	24	GI	Hole in base.............	.0	26.88	11- 8-48	T	T	400R	.....	......	450R	33.2
-1dcd	Jess Wilson......	60	28	GI	.....do..................	.0	27.53	11- 4-48	T	T	650R	.....	......	210R	25
-10ccb	C. A. Fleming....	100	24	GI	End of discharge pipe....	+4.0	32.28	11-10-48	T	T	250R	.....	......	60R	2.8
-11aba	K. S. Gotobed....	60	18	GI	Under pump base..........	.0	25.53	12-13-48	T	T	350R	.....	......	108R	6.5
-11acd	.....do..........	58	18	GI	Hole in base.............	.0	29.89	8-23-48	T	E	350R	.....	......	197C	12.7
-11cbb	Evert Schroer....	55	24	GI	Top of casing............	.0	26.72	11-10-48	T	T	......	.....	......	......	......

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
9-15-11cdb	Evert Schroer....	60	18	GI	Hole in pump base........	+0.5	29.71	11-10-48	T	T	800R	.....	......	600R	88.6
-11dbb	Wm. M. Rockford..	88	18	GI	No measuring point.......	....	.....	....	T	G	700R	.....	......	1,008R	129.3
-11ddb	Virgil Wilkie....	80	24	GI	.....do..................	....	40	Reported	T	T	1,000R	.....	......	720R	132.5
-12abb	Matt Meyers......	...	.....	....	.....do..................	....	.....	....	T	T	800R	.....	......	240R	35.4
-12aca	Mark Randel......	65	.....	....	Hole in pump base........	+.5	26.19	11- 8-48	T	T	1,000R	.....	......	765R	141
-12bbd	Jess Wilson......	55	18	GI	No measuring point.......	....	.....	....	T	E	400R	.....	......	384C	28.3
-12cbb	Fay Schroen......	65	24	GI	Top of casing............	+.5	32.30	11- 9-48	T	T	700R	.....	......	192R	24.8
-12ccc	Chas. Schroen....	74	24	GI	End of discharge pipe....	+3.5	32.28	11- 9-48	T	T	700R	.....	......	288R	37.2
-12dac	Roy Sheen........	60	24	GI	.....do..................	+3.5	28.66	11- 8-48	T	T	900R	.....	......	200R	33.2
-13acd	Delbert Lewis....	62	24	GI	Hole in base.............	.0	25.03	11- 9-48	T	E	1,000R	.....	......	285C	52.4
-13add	.....do..........	72	18	GI	.....do..................	.0	30.69	11- 9-48	T	T	950R	.....	......	1,200R	210
-13bbb	C. O. Newland....	65	24	GI	.....do..................	.0	38.30	8-21-48	T	E	994M	.....	......	279C	51.1
-13bcd	.....do..........	63	24	GI	.....do..................	.0	34.02	8-21-48	T	E	957M	.....	......	310C	55.6
-13ccb	Clifford Zehr....	64	18	GI	.....do..................	.0	26.89	11-10-48	T	T	1,000R	.....	......	680R	125
-13dbb	.....do..........	62	18	GI	No measuring point.......	....	.....	....	T	E	850R	.....	......	525R	82.4
-14aac	Milton Mickelson.	58	24	GI	Hole in base.............	.0	26.64	11-12-48	T	T	800R	.....	......	325R	47.8
-14abd	J. H. Corder.....	60	18	GI	.....do..................	+.5	28.20	11-16-48	T	E	650R	.....	......	298C	35.7
-14bcc	Warren Reynolds..	61	.....	....	.....do..................	+.5	28.62	8- 5-48	T	E	700R	.....	......	321C	41.4
-14ccc	.....do..........	55	18	....	.....do..................	+1.0	a39.90	8-21-48	T	E	865R	.....	......	392C	62.4
-14cdc	.....do..........	...	.....	....	No measuring point.......	....	.....	....	T	E	1,040R	.....	......	500R	95.9
-14dad	Milton Mickelson.	55	24	GI	Hole in base.............	.0	26.80	11-12-48	T	T	900R	.....	......	260R	43.2
-14dcc	J. H. Corder.....	60	18	GI	Hole under pump base.....	.0	27.62	11-16-48	T	E	900R	.....	......	144C	23.8
-14dcd	.....do..........	60	18	GI	Hole in pump base........	+.5	28.59	11-16-48	T	E	900R	.....	......	297C	32.6
-15adc	W. Hendrickson...	71	18	....	Hole in base.............	.0	31.52	8- 5-48	T	E	900M	.....	......	617C	102.2
-15bcb	.....do..........	69	.....	....	.....do..................	+.5	44.11	8- 5-48	T	E	275M	.....	......	441C	15.2
-15bdc	.....do..........	70	18	GI	.....do..................	+.5	28.41	11-15-48	T	T	622M	.....	......	450R	51.4
-15dbd	.....do..........	68	18	GI	.....do..................	+.5	30.44	11-16-48	T	E	925M	.....	......	602C	102.2
-15dcc	W. B. Cheney.....	60	18	....	.....do..................	+.5	30.55	11-16-48	T	E	1,000R	.....	......	490C	90.3
-16cad	Doug. Pederson...	61	18	GI	Bottom of discharge pipe.	+3.0	38.88	11-15-48	T	T	800R	.....	......	375R	55.2
-16ccb	.....do..........	60	18	GI	No measuring point.......	....	32	Reported	T	T	600R	.....	......	420R	45.3
-19dbb	Elton McKean.....	134	18	GI	Hole in base.............	.0	44.99	12- 5-48	T	E	600M	.....	......	800R	88.4
-20aac	Fred Sitz........	60	18	GI	.....do..................	+.5	34.59	11-15-48	T	T	700R	.....	......	302C	38.9
-20acd	.....do..........	62	18	GI	Hole in pump base........	+.5	46.67	8-27-48	T	E	840M	.....	......	348R	54.8
-20bba	W. Loewenstein...	120	18	GI	Hole in base.............	.0	50.27	12- 6-48	T	E	550R	.....	......	787C	79.8
-20bdd	.....do..........	90	18	GI	No measuring point.......	....	.....	....	T	E	800R	.....	......	1,440R	212.0

-20cbd	Archie Monson....	132	24	GI	.....do..................	....	40	Reported	T	E	900R	.....	......	802C	132.9
-20cda	.....do..........	73	24	GI	.....do..................	....	.....	....	T	E	900R	.....	......	294C	48.7
-20dbb	K. E. Brandt.....	67	18	GI	Hole in base............	.0	36.29	12- 6-48	T	E	700R	.....	......	387C	49.8
-20dcc	.....do..........	66	24	GI	.....do..................	.0	37.45	12- 1-48	T	E	796M	.....	......	390C	57.2
-20ddb	.....do..........	66	18	GI	Bottom of discharge pipe.	+3.5	37.20	12- 1-48	T	T	800R	.....	......	108R	15.9
-21bcb	Wendell Wilkie...	62	18	GI	Bottom edge of opening...	+.5	46.80	8-27-48	T	E	960M	.....	......	433C	76.6
-21cbb	C. R. Arbuckle...	63	24	GI	Top edge of base.........	.0	45.75	8-23-48	T	E	832M	.....	......	746C	114.2
-22aad	W. D. Cheney.....	60	18	GI	Bottom of discharge pipe.	+2.5	32.85	11-17-48	T	T	800R	.....	......	225R	33.2
-22ada	Ted Jeffries.....	65	18	GI	Hole in base............	+.5	33.98	11-17-48	T	E	1,000R	.....	......	220R	40.5
-23acc	Vern Young.......	62	18	GI	.....do..................	.0	29.22	11-12-48	T	E	1,250R	.....	......	78C	17.9
-23bbc	J. Erpelding.....	68	18	GI	Bottom edge of opening...	+.5	44.45	8-27-48	T	E	1,075M	.....	......	554C	109.6
-23bcd	.....do..........	68	18	GI	Hole in base............	+1.0	32.21	11-17-48	T	E	950R	.....	......	512C	89.6
-23cbc	.....do..........	...	.....	....	.....do..................	+1.0	33.09	11-17-48	T	E	750R	.....	......	507C	70.0
-23dbb	Vern Young.......	64	18	GI	.....do..................	.0	30.66	11-12-48	T	E	1,250R	.....	......	466C	107.2
-23dcc	.....do..........	58	18	GI	.....do..................	.0	28.35	11-12-48	T	E	1,250R	.....	......	302C	69.5
-24bbd	Clifford Zehr....	62	18	GI	.....do..................	+.5	30.85	11-10-48	T	E	1,000R	.....	......	408C	75.2
-24bcd	.....do..........	63	18	GI	.....do..................	+.5	28.53	12-13-48	T	E	1,000R	.....	......	220C	40.5
-24ccc	Wm. Marcus.......	68	18	GI	No measuring point.......	....	28	Reported	T	E	1,162M	.....	......	621C	128.7
-24dca	.....do..........	72	60-24	GI,T	Hole in base............	+2.0	32.63	11-16-48	T	E	1,000R	.....	......	536C	98.7
-24dcc	Dwayne Lewis.....	...	.....	....	Bottom of discharge pipe.	+3.0	33.43	11-16-48	T	T	750R	.....	......	300R	41.4
-25abb	H. E. Starkey....	65	18	GI	Hole in base............	+.5	32.13	11-26-48	T	E	1,000R	.....	......	38C	7.0
-25bcc	.....do..........	65	18	GI	.....do..................	+.5	32.14	11-29-48	T	E	1,200R	.....	......	720R	159
-25caa	Ted Cnick........	50	24	GI	.....do..................	.0	22.83	12- 2-48	T	E	750R	.....	......	1,080R	149
-25cbb1	H. E. Starkey....	50	60	T	Top of plank............	+.3	30.29	11-29-48	T	E	700R	.....	......	304C	39.2
-25cbb2	.....do..........	63	18	GI	No measuring point.......	....	28	Reported	T	E	1,141R	.....	......	744C	156.1
-25ccc	W. J. Knapp......	60	18	GI	End of discharge pipe....	+3.5	24.16	12-20-48	T	T	900R	.....	......	1,200R	198.9
-25dcc	Harold Brown.....	60	18	GI	Hole in base............	.0	20.51	12- 2-48	T	E	1,000R	.....	......	960R	177
-26acd	Hugh Moss........	60	24	GI	Hole below pump base.....	.0	33.09	12- 2-48	T	E	750R	.....	......	374C	51.6
-26adb	.....do..........	58	18	GI	Hole in base............	.0	33.80	12- 9-48	T	T	750R	.....	......	100R	13.8
-26bdc	Chas. Sitz.......	62	18	GI	No measuring point.......	.0	35	Reported	T	E	900R	.....	......	643C	106.7
-26cbd	Joe Cantreras....	60	18	GI	Hole in base............	.0	34.63	12- 2-48	T	E	900R	.....	......	416C	68.9
-26ccc	V. T. Henline....	52	18	GI	No measuring point.......	....	22	Reported	T	E	700R	.....	......	219C	28.2
-26dac	Del Lewis........	...	.....	....	....	....	.....	....	T	E	600R	.....	......	884C	97.6
-26dbd	.....do..........	58	24	....	Hole in base............	.0	28.68	9- 3-48	T	E	900R	.....	......	458C	76.0
-27ddc	C. Lindstrom.....	60	24	GI	Top of casing...........	.0	22.01	12- 2-48	T	E	400R	.....	......	272C	20.0
-29abb	L. L. Donally....	65	18	GI	Hole in base............	+.5	37.50	12- 7-48	T	G	1,000R	.....	......	720R	132.5
-29bab	.....do..........	117	18	GI	No measuring point.......	....	37	Reported	T	E	900R	.....	......	629C	104.2
-29baa	.....do..........	59	24	GI	Edge of casing...........	....	37.02	12- 6-48	T	T	600R	.....	......	378R	41.7
-29bdc	.....do..........	69	18	GI	No measuring point.......	....	33.0	....	T	E	1,000R	.....	......	237C	43.6
-29cad	H. Stonebarger...	61	18	GI	Bottom end of discharge pipe	+4.5	39.88	12- 7-48	T	T	1,000R	.....	......	280R	51.6
-29cdb	Evert Sheldon....	60	24	GI	Hole in base............	.0	35.66	12- 7-48	T	E	700R	.....	......	424C	54.6
-29cbd	H. Stonebarger...	60	18	GI	Bottom edge of discharge pipe	+4.0	40.16	12- 7-48	T	E	900R	.....	......	320C	53.0
-29dac	Wendell Wilkie...	...	.....	....	Hole in base............	+.5	33.95	12- 8-48	T	E	800R	.....	......	618C	91.1
-29dcb	E. C. Henderson..	60	24	GI	.....do..................	+.5	35.15	12- 8-48	T	E	1,000R	.....	......	752C	138.5
-30aaa	Elton McKean.....	66	24	GI	No measuring point.......	....	38	Reported	T	E	750R	.....	......	810C	111.8
-30ada	.....do..........	59	24	GI	.....do..................	....	36	Reported	T	T	600R	.....	......	300R	33.2
-30ccc	Harlan Hartman...	...	.....	....	Top of casing...........	+.5	33.4	3-16-49	T	T	450R	.....	......	960R	79.4

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
9-15-30dcd	Lawrence Kuebler.	58	18	GI	No measuring point.......	....	33	Reported	T	E	600R	.....	......	......	......
-30dbd	.....do..........	60	.....	GI	Hole in base............	+0.6	36.21	3-16-49	T	E	900R	.....	......	553C	91.6
-31aac	.....do..........	58	24	GI	.....do.................	.0	34.27	3-17-49	T	E	600R	.....	......	......	38.8
-31abb	Wm. M. Kuebler...	...	24	GI	.....do.................	.0	34.47	3-17-49	T	E	500R	.....	......	410C	37.7
-31adb	Bernard Bond.....	62	18	GI	.....do.................	+.6	34.49	3-17-49	T	E	825R	.....	......	610C	92.7
-31bcb	Elmer Erickson...	60	18	GI	No measuring point.......	....	30	Reported	T	E	550R	.....	......	......	......
-31caa	Dan Roeder.......	60	18	GI	Hole in base............	+.6	28.05	3-18-49	T	E	1,000R	.....	......	318C	58.5
-31cbb1	Lyle Hutchenson..	...	.....	T	No measuring point.......	....	27	Reported	VC	T	400R	.....	......	100R	7.4
-31cbb2	Bernard Bond.....	50	18	GI	.....do.................	....	22	Reported	T	E	400R	.....	......	200C	14.7
-31dac	.....do..........	...	.....	....	....	....	.....	....	T	T	700R	.....	......	......	......
-31dba	Dan Roeder.......	50	24	GI	Pump base...............	+.3	33.98	3-17-49	T	T	400R	.....	......	120R	8.8
-32abb	Don Slaughter....	55	24	GI	Hole in base............	....	28	Reported	T	E	564M	.....	......	796C	82.6
-32aca	.....do..........	50	24	GI	.....do.................	....	15	Reported	T	T	850R	.....	......	240R	37.6
-32bca	Everett Sheldon..	60	24	GI	.....do.................	.0	37.26	12- 7-48	T	E	1,200R	.....	......	455C	100.3
-32bcb	Doug. Peterson...	58	24	GI	.....do.................	+1.0	36.45	3-18-49	T	E	1,000R	.....	......	600R	110.3
-32bcc	.....do..........	60	24	GI	Hole under base..........	.0	25.92	3-18-49	T	T	1,000R	.....	......	......	......
-32cbc	August Swanson...	60	18	GI	No measuring point.......	....	28	Reported	T	T	1,000R	.....	......	400R	73.7
-32ccc	C. D. Corrigan...	...	.....	....	.....do.................	....	.....	....	T	E	550E	.....	......	399C	40.4
-32cdc	W. J. Rayback....	63	18	GI	.....do.................	....	21	....	T	T	1,000R	.....	......	240R	44.2
-32dcb	Lee Pemberton....	...	.....	....	....	.0	22.02	8- 9-48	T	E	700E	.....	......	603C	77.8
-33acc	Earl Snyder......	57	24	GI	Hole at pump base........	.0	22.11	12- 9-48	T	E	870M	.....	......	836C	134.0
-33cbc	Wayne Peterson...	...	.....	....	.....do.................	+1.0	22.98	8- 4-48	T	E	700E	.....	......	293C	37.8
-33ccb	Chas. Brink......	54	18	GI	No measuring point.......	....	19	Reported	T	E	900R	.....	......	555C	92.0
-33cdc	.....do..........	34	24	GI	Top of casing............	+1.5	20.05	3-22-49	VC	T	600R	.....	......	105R	11.6
-33dab	Ed Smallcomb.....	...	.....	....	Hole in base............	+.5	32.92	8-11-48	T	E	756M	.....	......	715C	99.4
-33dbc	Vincent Wolford..	67	24	GI	.....do.................	.0	21.86	12- 9-48	T	E	950R	.....	......	381C	66.6
-34acc	Glantz Bros......	42	24	GI	....	....	22	Reported	VC	T	600R	.....	......	220R	24.3
-34abc	.....do..........	62	18	GI	Hole in base............	+.5	21.53	12-22-48	T	E	950R	.....	......	583C	102.1
-34bbc	Cecil Wolford....	48	.....	....	.....do.................	+1.0	22.58	8- 4-48	T	E	842M	.....	......	814C	126.1
-34bbd	.....do..........	51	.....	....	....	....	.....	....	T	T	825E	.....	......	240R	36.5
-34cbb	Ross May.........	50	96	W	Hole in base............	+1.0	26.80	8-11-48	T	E	1,150M	.....	......	712C	150.8
-34dab	A. H. Merryman...	59	18	GI	.....do.................	+.5	18.59	12- 9-48	T	E	900R	.....	......	560C	92.8
-34dbb	Ralph Paist......	61	18	GI	.....do.................	+1.5	17.62	8- 4-48	T	E	1,200R	.....	......	679C	150.0
-35aac	W. J. Knapp......	66	18	GI	.....do.................	.0	22.15	12-16-48	T	T	875R	.....	......	1,200R	193.2
-35adb	Ralph Erpelding..	58	24	GI	No measuring point.......	....	18	Reported	T	T	800R	.....	......	800R	118.0

-35bbb	C. Lindstrom.....	65	24	GI	.....do.................	....	23	Reported	T	E	800R	.....	......	766C	61.3
-35bcb	Eugene Reynolds..	67	18	....	Hole in base............	+.5	19.42	8- 4-48	T	E	1,003M	10.73	4 hr	867C	160.1
-35bcc	.....do..........	60	.....	....	Top of casing...........	.0	(a)	....	T	T	850R	.....	......	384R	60.1
-35ccb	Wayne Mawhinney..	57	24	W,S	....	....	.....	....	T	E	1,860M	.....	......	87C	29.8
-35cdc	.....do..........	63	18	GI	Hole in base............	+1.0	22.64	8-14-48	T	E	950M	.....	......	34C	5.9
-35dcc	Ralph Erpelding..	60	18	GI	.....do.................	.0	15.38	12-16-48	T	E	900R	.....	......	538C	89.2
-36abb	Paul Reynolds....	58	24	GI	Bottom of base..........	+.5	20.60	8- 5-48	T	E	850R	.....	......	469C	73.3
-36adc	Harold Brown.....	62	18	GI	No measuring point......	....	22.0	....	T	E	1,000R	.....	......	886C	163.1
-36bbc	Edgar Reynolds...	44	24	W	Edge of opening.........	+1.5	21.40	8- 4-48	T	E	812M	.....	......	819C	122.4
-36cbb	Warren Reynolds..	47	24	W	.....do.................	+1.0	20.97	8- 4-48	T	E	700R	.....	......	934C	120
-36cbc	Paul Reynolds....	45	24	W	No measuring point......	....	.....	....	T	E	840M	.....	......	452C	70.0
-36ccc	.....do..........	39	24	W	Edge of opening.........	+.5	13.97	8- 4-48	T	E	700R	.....	......	367C	47.3
9-16-4bcc	Jess Knox........	46	18	GI	Hole in base............	+1.0	24.94	4- 7-49	T	G	500R	.....	......	960R	88.3
-6acb	Clarence Hart....	94	18	GI	No measuring point......	....	.....	....	T	G	1,100R	.....	......	150R	33.8
-8bda	Earl Eickueler...	200	18	GI	....	....	30	Reported	T	G	800R	.....	......	1,080R	158.9
-9bac	Lenard Prascher..	103	18	GI	Hole in base............	.0	31.30	4- 7-49	T	G	500R	.....	......	450R	41.4
-11bcc	Carl Webber......	150	18	GI	....	....	.....	....	T	G	800R	.....	......	1,200R	176.8
-12acc	Dean Eberhart....	65	18	GI	....	....	18.78	3-28-49	T	G	450R	.....	......	......	......
-12dbb	Dwight Beezley...	63	18	GI	No measuring point......	....	18	Reported	T	E	450R	.....	......	1,200R	99.3
-13bcc	Lawrence Rickter.	110	18	GI	Hole in base............	.0	28.05	3-23-49	T	T	850R	.....	......	......	......
-14cbc	R. L. Haskins....	150	18	GI	.....do.................	.0	18.88	4- 5-49	T	G	650R	.....	......	300R	35.9
-15ddb	Norris Kuebler...	122	18	GI	No measuring point......	....	15	Reported	T	G	600R	.....	......	540R	59.6
-24aab	Henry Beadle.....	142	18	GI	Hole in base............	+.5	54.90	3-23-49	T	G	450R	.....	......	320R	26.5
10-13-1dbb	Clarence Lee.....	50	18	....	No measuring point......	....	31	Reported	T	G	450R	.....	......	720R	59.6
-1dcc	.....do..........	200	18	....	Hole in base of turbine..	+.5	23.26	7-14-48	T	G	850R	.....	......	60R	93.8
-11ccb	Oliver Soucie....	60	18	....	No measuring point......	....	.....	....	T	G	......	.....	......	......	......
-11ccc	.....do..........	60	18	....	.....do.................	....	.....	....	T	G	......	.....	......	......	......
-11dbb	Geo. Schanou, Jr.	200	18	....	Bottom edge of opening...	+1.0	32.49	7-15-48	T	G	700R	.....	......	......	......
-12cba	C. W. Lewis......	47	18	....	Hole in base of turbine..	.0	23.43	7- 9-48	T	G	500R	.....	......	720R	66.3
-12cbb	.....do..........	51	18	....	Edge of opening.........	+.5	26.35	7- 9-48	T	E	600R	.....	......	940C	104.0
-12ccc	.....do..........	50	18	....	No measuring point......	....	27	Reported	T	E	200R	.....	......	560C	20.6
-13bdc	M. J. Uhrich.....	43	18	....	Bottom edge of opening...	+.5	22.37	7- 9-48	T	G	200M	.....	......	720R	26.5
-13bbc	.....do..........	43	18	....	No measuring point......	....	22	Reported	T	E	200R	.....	......	209C	7.7
-13ccc	Ralph Lewis......	50	18	....	Bottom edge of opening...	+.5	25	Reported	T	E	723M	14.7±	......	657C	87.5
-13dca	Walter Dubbs.....	50	18	....	Hole in base............	.0	28.90	7-13-48	T	E	510R	.....	......	624C	58.6
-13dcd	.....do..........	51	18	....	.....do.................	+.5	27.07	7-13-48	T	E	600R	.....	......	470C	51.9
-14aab	F. Loewenstein...	201	18	....	Bottom edge of opening...	+1.0	27.82	7-15-48	T	E	800R	.....	......	159C	23.4
-14ccc	Ralph Schanov....	200	18	....	.....do.................	+.5	25.17	7-15-48	T	E	1,000R	.....	......	0	......
-14dbc	F. Loewenstein...	225	18	....	.....do.................	+.5	22.50	7-15-48	T	G	800R	.....	......	0	......
-14dcc	.....do..........	48	18	....	.....do.................	+1.0	22.70	7-15-48	T	E	300R	.....	......	960R	53.9
-14dcd	.....do..........	80	18	....	.....do.................	+1.0	23.18	7-15-48	T	E	200R	.....	......	960R	35.3
-14ddd	.....do..........	50	24	....	2' x 6' cover...........	.0	24.47	7-15-48	..	..	400R	.....	......	960R	70.6
-15ccb	H. R. Rodriguez..	242	18	....	Hole in base............	+1.0	51.02	7-16-48	T	G	900R	.....	......	......	......
-21ccb	F. C. Hogg.......	50	18	....	Bottom edge of opening...	+.5	29.16	7-19-48	T	G	400R	.....	......	864R	63.6
-21cdc	.....do..........	50	18	....	.....do.................	+.5	27.30	7-19-48	T	E	400R	.....	......	386C	28.4
-21dcc	F. S. Henninger..	60	18	....	.....do.................	+1.0	28.36	7-19-48	T	E	300R	.....	......	806C	44.5
-21ddc	.....do..........	60	18	....	.....do.................	+1.0	25.13	7-19-48	T	E	534M	21.34	......	364C	35.8

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
10-13-22bcc	F. S. Henninger..	60	18	....	Hole in base............	0.0	28.73	7-19-48	T	E	300R	.....	......	236C	13.05
-22ccb	E. A. Hendrickson	60	18	....	Edge of opening..........	+1.5	26.76	7-19-48	T	E	369M	.....	......	600R	44.2
-22cdb	Ray Blue.........	48	18	....	No measuring point.......	....	.....	....	T	G	700R	.....	......	450R	58.0
-22dcc	Geo. Schanou, Jr.	50	18	....	.....do..................	....	.....	....	T	E	700R	.....	......	610C	78.6
-22acc	Bob Helser.......	50	18	....	.....do..................	....	.....	....	T	E	650R	.....	......	702C	84
-23acc	M. G. Halbert....	...	18	....	Hole in base............	+.5	23.15	7-14-48	T	E	......	.....	......	760C	......
-23acd	.....do..........	...	18	....	.....do..................	+.5	22.34	7-15-48	T	E	......	.....	......	762C	......
-23cba	Ray Blue.........	50	18	....	Top edge of casing.......	.0	23.53	7-12-48	T	E	700R	.....	......	374C	48.2
-23cbc	.....do..........	45	18	....	Bottom edge of opening...	+.5	21.58	7-12-48	T	E	700R	.....	......	435C	56.1
-23ccc	.....do..........	50	18	....	.....do..................	+.5	23.55	7-12-48	T	E	500R	.....	......	601C	55.3
-23dcc	Ralph Schanou....	47	18	....	No measuring point.......	....	.....	....	T	E	900R	.....	......	271C	44.9
-23ddc	.....do..........	48	18	....	Bottom edge of opening...	+.5	a41.95	8-26-48	T	E	514M	.....	......	365C	34.6
-24bcc	W. W. Bentley....	43	72	C	Top edge of steel brace..	.0	24.11	7-13-48	T	E	600R	.....	......	802C	88.6
-24ccb	Dean Noah........	52	18	....	Bottom edge of opening...	+1.0	25.84	7-13-48	T	E	960R	.....	......	479C	84.6
-24dcc	Carl Gangwith....	52	18	....	.....do..................	+1.5	29.77	7-13-48	T	E	700R	.....	......	454C	58.5
-24ddc	.....do..........	52	18	....	.....do..................	+.5	26.86	7-13-48	T	E	1,000R	.....	......	640C	118.0
-25acd	Robert Vohland...	52	72	W	Top edge of pipe.........	.0	26.89	7-12-48	T	E	741M	13.91	......	290C	32.6
-25bab	.....do..........	52	24	W	Bottom edge of opening...	+.5	29.51	7-12-48	T	E	900R	.....	......	407C	67.4
-25bcd	.....do..........	52	72	W	.....do..................	+1.0	22.36	7-12-48	T	E	995M	16.64	......	442C	81
-25ccc	R. S. Post.......	50	18	....	Small hole in base.......	+.5	24.12	7- 7-48	T	E	900R	.....	......	915C	151.5
-25dbc	Ray Uhrich.......	52	24	....	Bottom edge of opening...	+1.0	26.82	7- 7-48	T	E	465R	.....	......	578C	49.5
-25dcc	.....do..........	52	.....	....	End of discharge pipe....	+7.0	29.23	7- 7-48	T	E	465R	.....	......	229C	19.6
-26acc	D. Loewenstein...	52	18	....	Bottom edge of opening...	+1.0	24.38	7-12-48	T	E	1,100R	.....	......	728C	147.5
-26bdc	B. M. Rice.......	52	18	....	.....do..................	+1.0	24.95	7-12-48	T	E	1,000R	.....	......	833C	153.0
-26cbb	.....do..........	52	18	....	.....do..................	+.5	25.0	7-12-48	T	E	539M	.....	......	960R	95.4
-26ddd	F. A. Webben.....	50	18	....	.....do..................	+.5	22.03	7- 7-48	T	E	700R	.....	......	692C	89.3
-27abc	Bob Helser.......	51	18	....	No measuring point.......	....	.....	....	T	G	800R	.....	......	1,000R	147.4
-27bcc	E. Hendrickson...	55	24	....	.....do..................	....	20	Reported	T	E	500R	.....	......	592C	54.5
-27bdc	R. S. Braden.....	...	18	....	Bottom edge of opening...	+1.0	25.03	7-21-48	T	E	900R	.....	......	800R	......
-27bdd	.....do..........	55	18	....	No measuring point.......	....	.....	....	T	E	900R	.....	......	225C	37.3
-27ccc	Alfred Rowe......	50	18	....	Bottom edge of opening...	+.5	23.49	7- 8-48	T	E	1,100R	.....	......	446C	90.2
-27cdc	Leland Gangwish..	55	18	....	.....do..................	+.5	23.74	7- 7-48	T	G	800R	.....	......	0	......
-27dcc	.....do..........	55	24	....	No measuring point.......	....	24	Reported	T	E	740M	.....	......	720R	98.1
-27dcd	C. Scarorough....	60	18	....	Hole in base............	+.5	21.93	7- 8-48	T	T	900R	.....	......	420R	69.6
-28acc	E. Hendrickson...	55	18	....	No measuring point.......	....	21	Reported	T	E	750R	.....	......	570C	78.7

-28bcc	Weston Bros......	63	18	....	Edge of opening..........	+1.0	28.88	7-19-48	T	E	913M	21.22	......	731C	123.0
-28cba	R. O. Scott......	60	18	....	Hole in base............	+.5	25.46	7-20-48	T	E	850R	.....	......	765C	120.0
-28ddc	Ira Ross.........	55	18	....	.....do................	.0	20.78	7-20-48	T	G	840R	.....	......	......	......
-28dcb	Orval Ross.......	53	28	W	Bottom edge of opening...	+1.0	21.85	7-20-48	T	E	840R	.....	......	833C	129.0
-29aba	Leo Mayfield.....	55	18	....	No measuring point.......	....	36	Reported	T	E	450R	.....	......	1,018C	84.5
-29cab	Weston Bros......	55	18	....	.....do................	....	.....	....	T	E	750R	.....	......	732C	101.0
-29dcc	Wm. Kemp.........	69	18	....	.....do................	....	.....	....	T	E	750R	.....	......	205C	28.3
-31abb	Flory............	...	18	....	Bottom edge of opening...	+1.0	24.47	7-22-48	T	E	......	.....	......	407C	......
-31acc	H. Widdowson.....	62	18	....	No measuring point.......	....	.....	....	T	G	700R	.....	......	200R	25.8
-31bcb	Donald Spence....	65	18	....	.....do................	....	.....	....	T	E	400R	.....	......	708C	52.2
-31ccb	Louis Delgado....	57	18	....	Bottom edge of base......	+.5	26.69	7-23-48	T	E	827M	17.46	......	685C	104.0
-31ccd	.....do..........	60	24	....	Top edge of steel beam...	+.5	24.51	7-23-48	VC	G	1,000R	.....	......	700R	12.9
-32aac	Weston Bros......	55	18	....	No measuring point.......	....	.....	....	T	E	750R	.....	......	565C	78.0
-32acc	R. S. Braden.....	55	18	....	.....do................	....	.....	....	T	E	700R	.....	......	539C	69.5
-32bbc	H. Widdowson.....	62	18	....	.....do................	....	.....	....	T	E	840M	.....	......	555C	85.9
-32baa	Garnet Rose......	70	18	....	Hole in base............	.0	28.03	7-20-48	T	E	850R	.....	......	101C	15.8
-32ccb	D. Scarborough...	60	18	....	Bottom edge of opening...	+1.0	18.49	7-21-48	T	E	800R	.....	......	160C	23.6
-32dbb	E. D. Detman.....	55	18	....	Top of casing............	.0	20.89	7-22-48	T	G	800R	.....	......	......	......
-32ddc	.....do..........	60	18	....	No measuring point.......	....	.....	....	T	E	600R	.....	......	421C	46.5
-33abc	J. E. Casey......	60	18	....	Bottom edge of opening...	+1.0	20.72	7-22-48	T	E	750R	.....	......	421C	58.1
-33adc	.....do..........	54	72	....	.....do................	+.5	25.06	7-22-48	T	E	1,000R	.....	......	840R	155
-33bbc	D. Stubblefield..	60	18	....	No measuring point.......	....	.....	....	T	E	950R	.....	......	293C	51.2
-33bcb	Weston Bros......	60	18	....	Bottom edge of opening...	+1.0	24.19	7-19-48	T	E	823M	14.71	......	480R	72.7
-33cbb	Harvey Deets.....	52	24	....	.....do................	+.5	20.48	7-20-48	T	E	1,000R	.....	......	287R	52.8
-33ccb	.....do..........	65	18	....	.....do................	+1.0	18.85	7-20-48	T	E	866M	21.80	......	517R	82.4
-33daa	Norman Harris....	55	18	....	No measuring point.......	....	.....	....	T	E	800R	.....	......	......	......
-33dbb	.....do..........	55	72	....	.....do................	....	.....	....	T	T	950R	.....	......	......	......
-34aca	Blue.............	48	18	....	Bottom edge of opening...	+1.0	22.81	7- 8-48	T	E	900R	.....	......	490R	81.2
-34acc	.....do..........	48	18	....	.....do................	+1.0	23.63	7- 8-48	T	E	1,000R	.....	......	720R	132.0
-34bad	L. Gangwish......	55	18	....	Top of casing............	.0	21.79	7- 8-48	T	G	650R	.....	......	120R	14.37
-34bbb	Orval Ross.......	50	.....	....	No measuring point.......	....	20	Reported	T	E	615M	20.60	......	557C	63.1
-34cbb	Geo. Lowe........	50	18	....	Bottom edge of opening...	+.5	22.73	7- 8-48	T	E	800R	.....	......	775C	114
-34cad	.....do..........	50	18	....	Upper edge of steel plate	.0	19.25	7- 8-48	T	E	800R	.....	......	208C	30.6
-34dab	D. Stubblefield..	57	72	C	Top of casing............	.0	16.90	7- 7-48	T	G	900R	.....	......	540R	89.5
-34ddc	.....do..........	58	48	GI	Upper edge of 3" x 5" brace	.0	16.87	7- 7-48	T	G	900R	.....	......	540R	89.5
-35acb	F. A. Webben.....	50	18	....	No measuring point.......	....	.....	....	T	E	......	.....	......	408C	......
-35bbc	H. R. Rudriquez..	60	18	....	Lower edge of discharge pipe	+4.0	27.93	6-29-48	T	E	900R	.....	......	292C	48.4
-35bca	Alfred Rowe......	...	18	....	Top of casing............	.0	21.47	6-29-48	T	E	1,000M	17.50	......	411C	75.6
-35ccc	Cleo Mayfield....	51	18	....	Edge of opening..........	+.5	17.52	7- 8-48	T	E	660M	16.36	......	595C	72.3
-35cca	.....do..........	53	18	....	Upper edge of steel plate	.0	17.54	7- 8-48	T	G	600R	.....	......	450R	49.7
-35dad	F. A. Webben.....	51	18	....	No measuring point.......	....	.....	....	T	E	1,000R	.....	......	310C	57.1
-35dcc	R. L. Mackey.....	60	18	....	Bottom edge of opening...	+1.0	18.42	6-29-48	T	E	802M	13.78	......	458C	67.7
-36abb	W. P. O'Brien....	53	18	....	Hole in pump head........	+1.0	22.30	6-25-48	T	G	......	.....	......	......	......
-36acb	.....do..........	50	18	....	Bottom edge of opening...	+.5	22.37	6-29-48	T	G	650R	.....	......	1,000R	119.5
-36acc	.....do..........	50	18	....	.....do................	+1.0	21.28	6-29-48	T	G	800R	.....	......	1,000R	147.4
-36bbb	Geo. Woten.......	55	18	....	.....do................	+1.0	22.67	6-28-48	T	E	1,050M	20.03	......	507C	98
-36bcc	.....do..........	51	20	....	Top of casing............	+1.8	22.23	6-25-48	..	..	......	.....	......	......	......

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Buffalo County--Continued										
10-13-36bcd	Geo. Woten.......	50	18	....	Bottom edge of opening...	+1.0	21.56	6-25-48	T	E	800R	.....	......	868C	128
-36cbb	.....do..........	55	18	....	.....do..................	+1.0	20.54	6-25-48	T	E	556M	18.06	......	1,130C	116
-36ccc	Simon Kruger.....	47	18	....	No measuring point.......	....	17	Reported	T	E	......	.....	......	378R	......
-36dbb	J. L. Johnson....	52	18	....	.....do..................	....	.....	....	T	E	1,000R	.....	......	139C	25.6
-36dcc	.....do..........	54	18	....	Bottom edge of opening...	+1.5	19.81	7- 6-48	T	G	1,000R	.....	......	360R	61.25
10-14-34ddd	A. J. Paulson....	63	.....	....	Bottom of base...........	+1.0	34.08	7-28-48	T	E	250E	.....	......	208C	9.58
-35add	Hemmerling Bros..	75	.....	....	Hole in base.............	.0	43.33	7-27-48	T	E	620M	.....	......	277C	31.6
-35bcc	O. Linderstein...	81	.....	....	Opening in turbine.......	+.5	55.89	7-27-48	T	T	350R	.....	......	334R	21.5
-35caa	.....do..........	...	.....	....	.....do..................	+.5	33.47	7-27-48	T	T	900R	.....	......	182R	30.2
-35ddd	.....do..........	...	.....	....	....	....	.....	....	T	E	700R	.....	......	56C	7.22
-36aac	Luther Johnson...	...	24	....	No measuring point.......	....	38	Reported	T	T	250R	.....	......	114R	5.25
-36cbc	Tony Ellsmann....	62	18	....	....	....	.....	....	T	E	325E	.....	......	594C	35.6
-36dba	Garnet Rose......	65	.....	....	Opening in turbine.......	+1.0	37.41	7-27-48	T	E	700R	.....	......	677C	87.3
-36dcb	.....do..........	65	.....	....	.....do..................	+1.0	32.92	7-27-48	T	E	900R	.....	......	245C	40.6
10-17-17cdc	Marvin Mollard...	93	18	GI	Hole in base.............	.0	29.57	4- 5-49	T	T	600R	.....	......	225R	24.9
-18dac	.....do..........	130	18	GI	No measuring point.......	....	.....	....	T	T	600R	.....	......	300R	33.1
-20dad	....	...	.....	....	....	....	.....	....	..	..	......	.....	......	......	......
-21cbc	Ludwig Bros......	118	18	GI	Hole in base.............	.0	29.89	4- 6-49	T	T	650R	.....	......	450R	53.8
-21ccd	Walter Feast.....	117	18	GI	End of discharge pipe....	+3.5	34.03	4- 6-49	T	G	700R	.....	......	500R	64.3
-21cdc	.....do..........	...	.....	....	Hole in base.............	+1.5	29.43	5- 5-49	T	G	......	.....	......	......	......
-21dac	Ludwig Bros......	90	18	GI	.....do..................	.0	25.30	5- 5-49	T	E	400R	.....	......	604R	44.5
-26cba	Art Sanquist.....	...	.....	....	.....do..................	.0	23.49	5- 5-49	T	T	750R	.....	......	450R	62.1
-27aac	Fred Plishke.....	...	.....	....	.....do..................	.0	27.63	5- 5-49	T	T	800R	.....	......	......	......
-36dcc	Harvey Jacobson..	118	24	GI	.....do..................	.0	32.61	4- 7-49	T	G	1,000R	.....	......	700R	128.9
					Hall County										
9-11-5ccc	Elmer A. Gosda...	51	18	GI	Edge of discharge pipe...	+4.0	14.09	6-17-48	T	E	1,000R	.....	......	432C	79.5
-6cdc	Gavis S. Burmood.	62	18	GI	Hole in turbine..........	+1.0	5.52	6-17-48	T	E	1,000R	.....	......	695C	128
-6ccc	Charles Kunz.....	61	18	GI	Hole in base.............	+1.0	5.74	6-17-48	T	E	1,000R	.....	......	478C	87
-7cbc	Howard Rainforth.	50	18	GI	Hole in turbine..........	.0	9.51	6-17-48	T	E	1,000R	.....	......	1,200R	221
-8bcb	Elmer A. Gosda...	81	24	GI	.....do..................	+.3	7.21	6-17-48	T	E	1,100M	.....	......	658C	133.3
9-12-1ab	Hoffmann.........	90	18	....	No measuring point.......	....	.....	....	T	G	600R	.....	......	......	......
-1bcb1	Art Lambrecht....	60	18	....	Hole in base.............	.0	18.15	6-18-48	T	E	600R	.....	......	496C	54.8
-1bcb2	Hoffmann.........	90	18	....	.....do..................	.0	11.91	6-18-48	T	T	900R	.....	......	600R	99.4

-1cbc	Art Lambrecht....	87	18	....	.....do..................	.0	5.14	6-18-48	T	E	1,000R	.....	......	389C	71.6
-1ccc	.....do..........	48	24	....	.....do..................	.0	5.90	6-18-48	T	E	950R	.....	......	430C	75.2
-1dbc	Hoffman..........	90	18	....	No measuring point.......	....	.....	....	T	G	900R	.....	......	600R	99.4
-1dcc	Art Lambrecht....	48	18	....	Hole in base.............	.0	6.40	6-18-48	T	E	1,100R	.....	......	420C	85
-2abd	Ben Schoneberg...	52	18	....	.....do..................	.0	18.15	6-23-48	T	G	800R	.....	......	390R	48.5
-2acb	.....do..........	57	18	....	.....do..................	+.5	17.95	6-23-48	T	T	......	.....	......	......	......
-2bbb	J. C. McGowan....	61	24	....	.....do..................	.0	17.50	6-22-48	T	T	900R	.....	......	720R	119.3
-3aac	Leroy Bilslend...	60	24	....	.....do..................	.0	19.85	6-22-48	T	G	800R	.....	......	420R	61.9
-3acb	.....do..........	60	24	....	.....do..................	.0	19.50	6-23-48	T	G	1,000R	.....	......	936R	172.5
-3bcc	John Swisher.....	58	24	....	.....do..................	.0	17.50	6-22-48	T	T	1,000R	.....	......	672R	124
-3cdb	F. Bilslend......	58	24	....	No measuring point.......	....	.....	....	T	G	1,000R	.....	......	800R	147.5
-3cc	Cliff Edwards....	60	24	....	....	....	.....	....	T	G	1,000R	.....	......	800R	147.5
-3cd	E. Bilslend......	48	18	....	....	....	.....	....	T	..	......	.....	......	......	......
-3dab	J. C. McGowan....	60	18	....	Hole in base.............	.0	16.90	6-22-48	T	T	900R	.....	......	720R	119.3
-4acb	Roy Kister.......	41	24	....	Hole in turbine side.....	+.5	20.80	7- 1-48	T	G	1,100R	.....	......	1,100R	223
-4bdb	Wm. Hannon.......	55	24	....	Top of casing............	+.3	18.80	6-15-48	T	T	850R	.....	......	1,200R	188
-4cbb	Gills............	...	.....	....	....	....	.....	....	..	..	......	.....	......	......	......
-4dbb	C. K. Keller.....	57	24	....	No measuring point.......	....	15	Reported	T	T	900R	.....	......	320R	53
-5abc	Mary Mullen......	...	24	....	End of discharge pipe....	+3.0	21.74	7- 1-48	T	T	800R	.....	......	250R	36.8
-5bab	Henry Ruyle......	62	24	....	Hole in base.............	+.2	20.74	7- 1-48	T	T	1,000R	.....	......	......	......
-5dcd	E. F. Ohlman.....	56	18	....	No measuring point.......	....	15	Reported	T	T	900R	.....	......	320R	53
-6bb	Johnson..........	41	24	....	Hole in base.............	.0	20.30	7- 1-48	T	T	800R	.....	......	36R	5.31
-6bcc	.....do..........	63	24	....	Hole in turbine side.....	+.5	23.83	7- 1-48	T	T	1,000R	.....	......	108R	19.9
-6cb	Bowman...........	57	24	....	Hole in pump base........	+1.0	16.55	7- 1-48	T	G	1,000R	.....	......	360R	66.3
-7bbd	R. H. Ohlman.....	50	14	....	Bottom edge of opening...	.0	20.10	7- 1-48	T	T	600R	.....	......	240R	26.5
-7bcb	.....do..........	57	.....	....	Hole in turbine side.....	.0	15.50	7- 1-48	T	E	875M	10.75	......	450C	72.5
-7ccb	Mrs. Hill........	54	.....	....	Hole in base.............	.0	19.07	7- 1-48	T	E	......	.....	......	......	......
-7dbc	Ed. Lacey........	59	24	....	No measuring point.......	....	18	Reported	T	T	900R	.....	......	450R	74.5
-8adc	Simon Rivera.....	...	14	....	Bottom edge of opening...	.0	14.54	7- 1-48	T	T	600R	.....	......	......	......
-9baa	E. F. Ohlman.....	59	24	....	Crack in top of casing...	.0	21.20	6-29-48	T	T	700R	.....	......	300R	38.6
-9dbb	Homer Smith......	47	24	....	End of discharge pipe....	+3.0	10.80	6-22-48	T	T	900R	.....	......	350R	58
-10aac	L. Bilslend......	44	18	....	Hole in base.............	+.5	8.82	6-22-48	T	G	1,000R	.....	......	640R	118
-10abc	Lester Ramsey....	42	.....	....	Edge of turbine base.....	.0	9.70	6-22-48	T	T	750R	.....	......	720R	99.5
-10bba	Willard Palmer...	48	18	....	Hole in turbine side.....	+1.0	10.15	6-21-48	T	G	800R	.....	......	630R	92.8
-10cbb	Clarence Pope....	48	24	....	Hole in turbine base.....	.0	8.35	6-23-48	T	T	1,000R	.....	......	676R	124.5
-11bbc	L. Bilslend......	57	24	....	.....do..................	.0	8.89	6-21-48	T	G	1,100R	.....	......	640R	129.5
-11db	Elmer Pearson....	60	24	....	.....do..................	.0	6.82	6-18-48	T	G	1,100R	.....	......	560R	113.5
-12bbc	Rudolph Gloe.....	60	.....	....	.....do..................	.0	6.51	6-18-48	T	E	650R	.....	......	270C	32.3
-12bcc	.....do..........	57	.....	....	Top of casing............	+1.0	7.10	6-18-48	T	E	500R	.....	......	120R	11.05
-12dbc	Elmer Pearson....	60	.....	....	Hole in base.............	.0	6.86	6-18-48	T	T	1,100R	.....	......	560R	113.5
-13abb1	Chas. Kunz.......	60	18	C	Top edge of concrete pit.	.0	7.62	6-21-48	HC	T	......	.....	......	0	0
-13abb2	.....do..........	58	.....	....	Hole in base.............	.0	7.68	6-21-48	T	T	900R	.....	......	504R	83.5
-13bac	W. F. Thomson....	65	24	....	No measuring point.......	....	6	Reported	T	G	1,000R	.....	......	......	......
-13cbb	Elmer Pearson....	60	.....	....	.....do..................	....	6	Reported	T	G	1,100R	.....	......	560R	113.5
-13db	Rainsforth.......	60	.....	....	Top of frame base........	.0	4.3	6-24-48	VC	T	750R	.....	......	750R	103.8
-14abc	Adolph Schmidt...	...	18	....	No measuring point.......	....	.....	....	T	G	1,000R	.....	......	300R	55.3
-14cbb	.....do..........	59	24	....	Top of casing............	.0	7.05	6-23-48	T	G	1,000R	.....	......	600R	110.7
-14cbc	Heinrichs........	60	24	....	End of discharge pipe....	.0	9.80	6-24-48	T	T	900R	.....	......	588R	97.5

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Hall County--Continued										
9-12-14ccc	Adolph Schmidt...	60	24	....	Hole in base............	+1.0	7.50	6-22-48	T	G	1,100R	.....	......	600R	121.5
-14dcc	Albert...........	69	18	....	.....do..................	+.5	7.86	6-23-48	T	T	1,100R	.....	......	800R	162
-16dcc	E. F. Ohlman.....	50	.....	....	No measuring point.......	....	4	Reported	HC	T	......	.....	......	......	......
-17dbc	Walter Ashton....	46	24	....	Top of concrete pit......	.0	6.96	6-30-48	HC	T	800R	.....	......	180R	26.5
-19acc	Jim Jacobs.......	42	18	....	Hole in base............	+.5	5.97	7- 2-48	T	G	1,000R	.....	......	300R	55.3
-19bcc	Ralph Reeder.....	53	18	....	No measuring point.......	....	.....	....	T	T	1,000R	.....	......	480R	88.4
-19cbb	James Ashton.....	42	18	....	....	....	6	Reported	T	T	1,000R	.....	......	......	......
-19ccb	D. J. Walker.....	42	24	....	Hole in concrete base....	.0	3.92	7- 2-48	T	T	900R	.....	......	96R	15.9
-19dbb	.....do..........	42	24	....	No measuring point.......	....	6	Reported	T	T	900R	.....	......	315R	52.2
-20aac	Miller...........	50	24	....	Hole in base............	+1.0	7.98	6-28-48	T	T	750R	.....	......	140R	19.3
-20aca	.....do..........	30	24	....	End of discharge pipe....	+4.5	11.22	6-29-48	T	G	800R	.....	......	140R	20.6
-20bcb	Burmood..........	53	24	....	No measuring point.......	....	7	Reported	T	T	1,000R	.....	......	510R	94
-20bcc	.....do..........	49	24	....	Hole in base............	.0	5.45	6-29-48	T	T	1,000R	.....	......	240R	44.2
-20cbc	D. J. Walker.....	51	24	....	Top of concrete pit......	+.5	6.35	6-30-48	HC	T	1,000R	.....	......	315R	58
-20dbb	Bill Cowle.......	51	24	....	End of discharge pipe....	+1.0	11.78	6-28-48	T	T	1,000R	.....	......	360R	66.3
-20ddc	.....do..........	51	24	....	Top of plank across pit..	.0	6.75	6-28-48	HC	T	1,000R	.....	......	360R	66.3
-21abc	George Codner....	60	24	....	Hole in base............	.0	6.58	6-25-48	T	T	1,000R	.....	......	510R	94
-21bbb	Lester Codner....	50	24	....	No measuring point.......	....	7	Reported	T	T	1,000R	.....	......	56R	10.3
-21bbc	.....do..........	50	24	....	.....do..................	....	8	Reported	HC	T	800R	.....	......	720R	106
-21cbb	.....do..........	56	24	....	.....do..................	....	7	Reported	T	T	1,000R	.....	......	360R	66.3
-21ccc	Lacey............	62	24	....	Hole in base............	....	9.48	6-25-48	T	T	1,000R	.....	......	360R	66.3
-22aac	Taylor...........	55	24	....	No measuring point.......	....	8	Reported	T	G	1,000E	.....	......	600C	110
-22abc	Albert...........	62	18	....	Hole in side of turbine..	+.5	7	Reported	T	G	1,000R	.....	......	360R	66.3
-29abc	Henry Rodriquez..	53	18	....	End of discharge pipe....	+2.5	13.4	6-29-48	T	T	1,000R	.....	......	......	......
-29bcc	S. P. Burmood....	55	24	....	.....do..................	+2.5	11.64	6-29-48	T	T	1,000R	.....	......	72R	13.3
-29bdb	.....do..........	55	24	....	Top of casing...........	+1.5	9.54	6-29-48	T	T	1,000R	.....	......	96R	17.7
-30aca	Bob Miller.......	55	24	....	End of discharge pipe....	+4.0	12.10	6-30-48	T	T	1,000R	.....	......	150R	27.6
-30bbc	Mrs. Hill........	38	36	....	Top of concrete pit......	.0	6.90	6-30-48	HC	T	850R	.....	......	330R	51.7
10-11-6adb	H. Wise..........	65	18	GI	Hole in base............	.0	28.88	6-14-48	T	G	1,000R	.....	......	500R	92.1
-6bac	F. Fink..........	62	24	GI	.....do..................	.0	35.48	6-14-48	T	G	1,000R	.....	......	810R	149.1
-6bba	W. R. Binfield...	67	18	GI	Hole in side of turbine..	+1.0	35.79	6-14-48	T	E	1,000R	.....	......	332C	61.1
-6cca	H. G. Stevens....	60	24	GI	No measuring point.......	....	30	Reported	T	E	1,000R	.....	......	243C	44.75
-6ccc	.....do..........	62	24	GI	Top edge of turbine base.	.0	29.16	6-14-48	T	T	800R	.....	......	350R	51.5
-6dba	.....do..........	62	24	C	No measuring point.......	....	.....	....	T	T	1,000R	.....	......	300R	55.2
-6dbc	.....do..........	62	24	W	Hole in pump base........	+.2	29.38	6-14-48	T	E	1,000R	.....	......	347C	63.8

-7abc	John Layher......	60	18	GI	.....do..................	.0	26.21	6-14-48	T	T	800R	.....	......	640R	94.3
-7bbc	Mrs. Forrest Miller	65	18	GI	Edge of discharge pipe...	+5.0	36.45	6-11-48	T	E	1,000R	.....	......	860C	157.4
-7bcb	.....do..........	57	18	GI	.....do..................	+3.0	34.66	6-11-48	T	T	800R	.....	......	322R	47.5
-7cbb	John Moss........	65	18	GI	Hole in base.............	.0	27.10	6-11-48	T	T	1,000R	.....	......	600R	110.7
-7dbc	Frank Layher.....	62	18	GI	.....do..................	.0	22.85	6-14-48	T	T	......	.....	......	......	......
-7dcc	.....do..........	60	18	GI	.....do..................	+.5	24.02	6-14-48	T	T	......	.....	......	......	......
-8cbc	....	65	24	GI	Edge of casing...........	.0	20.65	6-11-48	VC	T	800R	.....	......	208R	30.6
-8ccc	....	65	18	GI	Hole in base.............	.0	23.53	6-11-48	T	T	800R	.....	......	352R	51.9
-8cda	....	60	24	GI	Edge of casing...........	.0	23.56	6-11-48	VC	T	......	.....	......	......	......
-17bb	Lowell Boyd......	65	24	GI	Hole in base.............	+.5	23.46	6-10-48	T	G	900R	.....	......	680R	112.8
-17bcc	Partridge........	65	18	GI	.....do..................	.0	21.89	6-11-48	T	T	1,000R	.....	......	560R	103.2
-17bdc	.....do..........	65	18	GI	Edge of casing...........	.0	21.25	6-11-48	VC	T	900R	.....	......	560R	92.8
-17cba	.....do..........	65	18	GI	Hole in base of turbine..	.0	22.29	6-11-48	T	T	1,000R	.....	......	560R	103.3
-17ccb	John Caveny......	62	18	GI	Hole in casing...........	.0	16.58	6-11-48	T	T	......	.....	......	......	......
-18bb	Arvidson.........	65	18	GI	Hole in side of turbine..	+.5	24.25	6-10-48	T	T	700R	.....	......	400R	51.6
-18bcc	.....do..........	63	18	GI	Turbine base.............	.0	24.10	6-10-48	T	G	900R	.....	......	696R	115.4
-18cbc	Leo. Rowley......	65	24	GI	Hole in turbine base.....	.0	26	Reported	T	G	1,050R	.....	......	200R	38.6
-18cbb	.....do..........	60	18	GI	.....do..................	.0	23.80	6-10-48	T	G	1,050R	.....	......	150R	29
-18dbb	John Caveny......	65	18	GI	.....do..................	.0	23.60	6-10-48	T	G	700R	.....	......	120R	15.5
-18dcb	H. Lottesliger...	63	18	....	No measuring point.......	....	.....	....	T	P	1,000R	.....	......	1,000R	184
-19abc	Wagoner..........	62	18	GI	.....do..................	....	17	Reported	T	G	800R	.....	......	504R	74.3
-19adb	Heiser...........	65	18	....	.....do..................	....	18	Reported	T	T	800R	.....	......	600R	88.5
-19bbb	H. Lottesliger...	63	24	GI	Top of casing............	.0	19.40	6-10-48	VC	G	900R	.....	......	500R	82.8
-19dcb	Reeder...........	...	18	GI	Hole in base.............	+.5	16.67	6-15-48	T	T	900R	.....	......	900R	149
-19dcc	....	62	18	GI	.....do..................	.0	15.87	6-15-48	T	T	......	.....	......	......	......
-20acb	Ed Hofricter.....	59	72x72	C	Top of casing............	.0	17.85	6-10-48	HC	T	1,000R	.....	......	1,000R	184
-20bbd	H. Lottesliger...	65	18	....	Edge of discharge pipe...	+3.0	17.42	6-10-48	T	G	1,000R	.....	......	500R	92.2
-20bcc	....	60	24	I	Top edge of beam.........	.0	16.3	6- 9-48	VC	G	300R	.....	......	72R	3.98
-20cbc	H. A. Gerson.....	63	18	I	Hole in base.............	+.5	18.53	6- 9-48	T	T	1,200R	.....	......	840R	185.5
-20ccc	.....do..........	65	18	GI	.....do..................	.0	17.37	6- 9-48	T	T	1,200R	.....	......	......	......
-20dac	Otto Meyer.......	65	18	....	Top of casing............	.0	17.16	6-10-48	VC	T	700R	.....	......	420R	54.2
-20dbb	.....do..........	61	18	....	Hole in base.............	+.6	18.03	6-10-48	T	T	1,000R	.....	......	......	......
-20dcb	.....do..........	65	24	GI	Top of beam..............	+2.0	19.34	6-10-48	VC	T	700R	.....	......	420R	54.2
-21ddd	G. Krolikowski...	60	18	GI	Hole in base.............	.0	18.03	6-10-48	T	T	700R	.....	......	840R	108.5
-29aad	Harrold Strasser.	60	18	....	.....do..................	+.5	20.24	6-16-48	T	T	1,000R	.....	......	1,040R	192
-29bbc	J. E. Hayse......	58	18	....	.....do..................	.0	17.53	6-16-48	T	G	1,000R	.....	......	658R	121.3
-29cac	Swede Munson.....	60	24	GI	Top of casing............	.0	20.10	6-16-48	VC	G	......	.....	......	......	......
-29ccb	A. R. Ullstrom...	48	18	....	No measuring point.......	....	.....	....	T	T	1,200R	.....	......	420R	92.8
-29ccc	J. E. Hayse......	97	18	....	Hole in base.............	.0	16.65	6-16-48	T	G	1,000R	.....	......	630R	116.0
-29ccd	A. R. Ullstrom...	65	18	....	.....do..................	+.5	21.22	6-16-48	T	G	1,200R	.....	......	300R	66.3
-29daa	Harrold Strasser.	60	18	....	End of discharge pipe....	+3.5	22.83	6-16-48	T	T	1,000R	.....	......	540R	99.4
-29dbb	Wayne Culp.......	60	18	....	Hole in base.............	.0	19.89	6-16-48	T	E	1,000R	.....	......	868C	159.8
-30aba	Ben Camp.........	50	18	....	.....do..................	.0	19.56	6-15-48	T	T	1,000R	.....	......	600R	110.5
-30acc	.....do..........	50	18	....	.....do..................	....	.....	....	T	G	1,200R	.....	......	600R	132.7
-30bbb	Bill Boeka.......	60	18	....	.....do..................	+.2	17.50	6-15-48	T	NG	1,038M	15.0	4 hr	600R	114.7
-30bcc	.....do..........	60	18	....	.....do..................	+.3	19.37	6-15-48	T	T	1,014M	18.88	......	675R	126
-30cac	.....do..........	60	18	....	End of discharge pipe....	+.6	19.38	6-15-48	T	G	1,000R	.....	......	600R	110.5
-30ccc	Davis............	60	18	....	Hole in base.............	.0	16.47	6-15-48	T	T	1,000R	.....	......	400R	73.7

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Hall County--Continued										
10-11-30cdc	Ed. Lilly	...	18	GI	Hole in base	0.0	18.20	6-15-48	T	T	1,000R	.....	......	......	......
-30dcc	McDermott	58	18	....	No measuring point	....	.....	....	..	..	800R	.....	......	600R	88.4
-31bdc	....	...	18	....	Hole in base	.0	14.62	6-17-48	..	..	......	.....	......	......	......
-31cac	Deacon Wiggins	60	18	....	Top edge of turbine base	+.5	18.60	6-17-48	T	T	......	.....	......	......	......
-31ccc	C. R. Wade	56	18	....	Hole in base	.0	18.39	6-17-48	T	T	1,000R	.....	......	630R	116.0
-31cbd	Art Lambrecht	60	18	....	.....do	.0	19.06	6-17-48	T	G	800R	.....	......	294R	43.3
-32bba	D. W. Mahurin	60	18	....	.....do	.0	17.85	6-16-48	T	T	1,000R	.....	......	504R	92.8
-32bcc	.....do	57	18	....	.....do	.0	17.84	6-16-48	T	T	1,000R	.....	......	504R	92.8
10-12-1acd	Wayne Binfield	60	24	....	.....do	.0	31.37	6-15-48	T	E	943M	.....	......	748C	129.9
-1bcc	John Doberstein	60	24	....	.....do	.0	33.19	6-14-48	T	T	1,000R	.....	......	660R	122
-1bdc	.....do	55	.....	....	.....do	+.5	31.99	6-14-48	T	E	700R	.....	......	633C	81.6
-1ccc	Layher Bros	55	24	C	Hole in well cover plate	.0	31.07	6-14-48	T	E	800R	.....	......	310C	45.7
-1cdc	Wiseman	54	.....	....	Hole in base	.0	31.06	6-15-48	T	G	900R	.....	......	110	18.25
-1dbd	J. H. Jacobs	59	.....	....	Hole in side of turbine	+.5	31.70	6-15-48	T	E	662M	12.67	20 min	257C	31.3
-2aac	Rohrich	58	.....	....	Hole in base	+.5	36.29	6-17-48	T	T	700R	.....	......	800R	103
-2aad	.....do	...	18	....	Top of casing	.0	36.72	6-17-48	T	T	650R	.....	......	800R	95.8
-2acb	Orval Schweitzer	56	.....	....	Hole in base	.0	34.52	6-16-48	T	E	700R	.....	......	482C	62
-2bcc	W. Lillienthal	56	.....	....	.....do	.0	32.57	6-16-48	T	T	900R	.....	......	315R	52.2
-2bdb	.....do	...	.....	....	No measuring point	.0	.....	....	T	T	700R	.....	......	150R	19.34
-2cbd	Kohnk	...	.....	....	Opening in side of turbine	+.4	37.44	6-15-48	T	G	800R	.....	......	294R	43.3
-2cbd	Davis	68	18	....	Top edge of casing	+.5	36.41	6-15-48	T	T	700R	.....	......	744R	95.9
-2dbc	Sims	66	.....	....	Opening in side of turbine	.0	35.73	6-16-48	T	E	1,000R	.....	......	214C	39.4
-2dcc	Ralph Miller	60	18	....	.....do	+1.0	31.70	6-15-48	T	E	735R	.....	......	213C	28.8
-3bcc	Charlie Bachkora	61	.....	....	Hole in base	+.5	30.64	6-18-48	T	E	705M	14.70	2 hr	473C	61.20
-3bdd	Leo Leonard	60	.....	....	.....do	.0	29.50	7- 6-48	T	T	1,000R	.....	......	900R	166
-3dcd	W. Woitaszwskie	52	18	....	.....do	.0	30.19	6-16-48	T	T	900R	.....	......	900R	149
-3ddd	John Layher	...	24	....	Top of casing	.0	31.61	6-15-48	VC	T	800R	.....	......	......	......
-4acc	Arch Ewing	52	24	B	.....do	.0	28.50	6-15-48	T	E	700R	.....	......	630C	81.2
-4adb	.....do	54	24	B	.....do	.0	29.05	6-25-48	T	E	600R	.....	......	807C	8.58
-4bcc	Frank Dority	61	24	....	.....do	.0	26.64	7-19-48	T	T	800R	.....	......	390R	57.5
-4bdc	.....do	...	.....	....	Hole in base	.0	28.48	6-25-48	T	E	500E	.....	......	329C	30.3
-4cbb	E. F. Frazell	51	.....	....	.....do	.0	27.15	6-28-48	T	E	600F	.....	......	357C	39.45
-4ccc	.....do	51	.....	....	.....do	.0	29.06	6-24-48	T	E	721M	15.24	......	526C	69.85
-4dcc	Rickardt	60	.....	....	.....do	.0	29.27	6-23-48	T	G	850R	.....	......	720R	113
-5accl	E. F. Frazell	50	.....	....	Opening in side of turbine	.0	32.47	9- 3-48	T	T	......	.....	......	......	......

-5acc2	.....do..........	49	.....	....	Hole near turbine base...	.0	32.10	9- 3-48	T	T	375R	.....	......	1,752R	121
-5cbd	Clyde Headley....	60	.....	....	....	....	.....	....	T	T	630R	.....	......	......	......
-7da	Geo. L. Watson...	...	.....	....	No measuring point.......	....	.....	....	T	E	700R	.....	......	664C	85.6
-8acc	Clyde Headley....	56	.....	....	Opening in side of turbine	+.5	30.30	6-28-48	T	T	800R	.....	......	360R	53
-8ada	.....do..........	50	.....	....	Hole in base............	.0	29.61	6-28-48	T	E	632R	.....	......	446C	51.9
-8bcc	Daly.............	47	24	....	Top edge of casing.......	+.5	27.79	7-15-48	VC	T	400R	.....	......	1,800R	132.7
-8bcd	.....do..........	47	.....	....	Hole in base............	+1.0	29.05	7-15-48	T	T	350R	.....	......	1,800R	116
-8cbc	Leslie McCord....	57	.....	....	.....do..................	.0	29.17	6-23-48	T	T	400R	.....	......	525R	38.7
-8dbc	Clyde Headley....	60	.....	....	.....do..................	.0	28.14	6-29-48	T	E	600R	.....	......	281C	31.06
-8cdd	Leslie McCord....	55	.....	....	.....do..................	.0	27.94	6-23-48	T	E	600R	.....	......	254C	28.08
-8dcc	Louis Miller.....	...	.....	....	Opening in side of turbine	+.5	26.87	6-29-48	T	E	504M	14.91	......	487C	45.2
-9bcc	Dubbs............	...	.....	....	Hole in base............	+.5	27.48	6-24-48	T	T	700R	.....	......	1,080R	139
-9ccc	Leslie McCord....	...	.....	....	.....do..................	+1.0	28.27	6-24-48	T	T	......	.....	......	......	......
-9dcc1	Bill Hannon......	53	.....	....	Edge of steel frame......	+.5	29.29	7-19-48	VC	T	......	.....	......	......	......
-9dcc2	.....do..........	54	.....	....	Opening in side of turbine	+1.0	30.19	7- 9-48	T	E	850R	.....	......	287C	44.9
-10acc	A. Ewing.........	58	24	....	No measuring point.......	....	.....	....	T	T	750R	.....	......	420R	57
-10bbb	W. Woitaszwskie..	53	24	....	Edge of turbine base.....	+1.0	29.76	6-16-48	T	T	600R	.....	......	900R	94
-10bcc	J. Ciemnoczlonski	52	.....	....	Opening in side of turbine	+.5	27.94	6-24-48	T	G	900R	.....	......	255R	42.3
-10bd	.....do..........	53	.....	....	Hole in base............	+1.0	30.65	6-24-48	T	T	900R	.....	......	525R	87
-10ccc	Harold Klein.....	58	.....	....	.....do..................	.0	30.20	6-16-48	T	T	1,000R	.....	......	1,200R	221
-10ddc	.....do..........	70	18	....	.....do..................	.0	42.80	6-18-48	T	G	900R	.....	......	1,200R	198
-11abc	Ralph Miller.....	60	24	....	.....do..................	.0	30.89	6-15-48	T	E	720R	.....	......	587C	77.8
-11acc	John Doberstein..	60	24	....	No measuring point.......	....	.....	....	T	T	1,000R	.....	......	1,320R	243
-11bdd	John Layher......	55	.....	....	Hole in base............	.0	35.85	6-15-48	T	T	750R	.....	......	560R	77.4
-11dcd	M. Bockstadter...	60	.....	....	Opening in side of turbine	+.5	33.17	6-17-48	T	E	909M	11.48	......	422C	70.6
-11ddc	.....do..........	63	.....	....	Top edge of platform.....	+1.0	34.75	6-17-48	VC	T	600R	.....	......	470R	51.9
-12acc	Fred Eickhoff....	60	.....	....	Hole at turbine base.....	.0	30.42	6-15-48	T	T	900R	.....	......	720R	119.3
-12adc	.....do..........	61	.....	....	Top of steel frame.......	.0	30.25	6-15-48	T	T	800R	.....	......	720R	106
-12cbd	.....do..........	60	.....	....	Hole in base............	.0	32.08	6-15-48	T	E	900R	.....	......	267C	44.2
-12ccc	Dale McTavish....	59	.....	....	.....do..................	.0	30.00	6-15-48	T	T	700R	.....	......	720R	92.8
-12dbb	Joe Rickardt.....	62	24	....	Top of 2" coupling.......	+.5	31.35	6-15-48	T	T	900R	.....	......	630R	104.5
-12dcd	.....do..........	60	42	....	Hole in base............	.0	23.38	6-15-48	T	T	900R	.....	......	630R	104.5
-13acb	Wagner...........	60	24	....	Top of steel frame.......	+.5	23.69	6-24-48	VC	T	750R	.....	......	560R	77.4
-13bab	G. R. Wiseman....	64	72	....	Top of casing............	+1.0	25.34	6-19-48	T	E	685R	.....	......	220C	27.8
-13cbb	Dale McTavish....	65	.....	....	No measuring point.......	....	.....	....	T	T	800R	.....	......	720R	106
-13cdc	.....do..........	67	.....	....	.....do..................	....	.....	....	T	T	800R	.....	......	720R	106
-14aba	Jay Mays.........	...	.....	....	.....do..................	....	.....	....	T	T	800R	.....	......	840R	124
-14acc	.....do..........	56	.....	....	Opening in side of turbine	+.5	25.66	6-17-48	T	E	1,100R	.....	......	145C	29.4
-14bbc	McGuire..........	56	.....	....	No measuring point.......	....	.....	....	VC	T	650R	.....	......	100R	12
-14cac	Fairbanks........	...	.....	....	.....do..................	....	.....	....	T	T	385M	.....	......	......	......
-14ccb	.....do..........	62	.....	....	Hole in base............	.0	25.95	6-18-48	T	G	1,005M	9.35	......	130R	22.2
-14dab	Will Leonard.....	58	24	....	Hole in well cover plate.	.0	25.42	6-17-48	T	E	759M	11.13	......	165C	23.1
-14dcb	Fred Eickoff.....	62	24	....	Top of casing............	.0	23.79	6-18-48	T	G	700R	.....	......	196R	25.3
-15acc	Louie Skeen......	...	.....	....	Hole in base............	+.5	33.09	7-20-48	T	T	750R	.....	......	......	......
-15bcb	.....do..........	...	.....	....	1 in. pipe in base.......	+.5	32.77	7- 6-48	T	T	800R	.....	......	......	......
-15ccc	Leonard..........	...	24	....	Top of casing............	+.5	26.32	6-18-48	VC	T	800R	.....	......	540R	79.6

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Hall County--Continued										
10-12-15ccd	Leonard..........	...	24	....	Hole in turbine base.....	0.0	29.74	6-18-48	T	T	1,000R	.....	......	540R	99.5
-16acc	Claus Boltz......	59	24	....	Top of casing...........	.0	32.90	9- 3-48	T	T	650R	.....	......	900R	108
-16bdb	Leslie Mattison..	54	.....	....	Opening in side of turbine	+1.0	31.00	7-19-48	T	E	700R	.....	......	411C	53
-16ccb	Charles Connor...	60	18	....	Hole in base............	.0	36.34	6-24-48	T	E	800R	.....	......	168R	24.8
-16dcb	Fred Schroeder...	61	.....	....	Top of casing...........	.0	32.61	7-13-48	T	G	750R	.....	......	750R	104
-17acc	Eickenburg.......	52	.....	....	Hole in base............	.0	27.80	7-14-48	T	T	400R	.....	......	......	......
-17acd	.....do..........	...	.....	....	No measuring point.......	....	27	Reported	T	E	700R	.....	......	484C	62.4
-17bcb	Erwin Loffer.....	...	.....	....	Hole in base............	.0	26.58	7-14-48	T	G	750R	.....	......	350R	48.3
-17bcd	.....do..........	...	.....	....	.....do..................	.0	29.72	7-29-48	T	E	600R	.....	......	434C	48
-17bdb	Miller...........	...	.....	....	Opening in side of turbine	+1.0	28.56	7-14-48	T	E	800R	.....	......	657C	96.9
-17cca1	Walter Holtz.....	...	.....	....	....	....	.....	....	T	E	550R	.....	......	573C	58
-17cca2	.....do..........	52	.....	....	Hole in base............	.0	29.07	7- 9-48	T	T	......	.....	......	0	0
-17ccc	.....do..........	55	.....	....	Opening in side of turbine	+1.0	30.58	7- 9-48	T	E	600R	.....	......	496C	54.8
-17ddc	H. Lovejoy.......	64	.....	....	Hole in base............	+.5	36.07	7-14-48	T	T	600R	.....	......	600R	66.2
-18acc	John Barrens.....	...	.....	....	....	....	.....	....	..	..	600R	.....	......	......	......
-18bca	Fred Schroeder...	50	72	....	....	....	.....	....	..	..	850R	.....	......	750R	117.5
-18ccc	Herb Arnold......	...	.....	....	Opening in side of turbine	+.5	27.07	6-24-48	T	E	351M	.....	......	733C	47.4
-18dbc	Erwin Holtz......	52	.....	....	Hole in base............	.0	28.69	7-21-48	T	E	700R	.....	......	425C	54.8
-18ddc	.....do..........	54	.....	....	.....do..................	.0	28.65	6-24-48	T	T	......	.....	......	......	......
-18ddd	.....do..........	50	.....	....	.....do..................	.0	29.32	6-24-48	T	E	553M	13.82	......	585C	59.6
-19acc	Del Frazell......	...	.....	....	No measuring point.......	....	.....	....	..	..	......	.....	......	......	......
-19ada	.....do..........	78	18	....	Hole in base............	.0	38.82	7-12-48	T	E	864M	12.05	8 hr	608C	96.7
-19bcc	Dubbs............	48	.....	....	Opening in side of turbine	.0	27.15	7- 9-48	T	T	630M	14.75	36 hr	1,008R	110.4
-19cbb	Stuart Schepers..	55	.....	....	Hole in base............	.0	27.85	7- 9-48	T	T	400R	.....	......	1,080R	79.5
-19cbc	.....do..........	55	18	....	.....do..................	.0	27.60	7- 9-48	T	T	764M	15.90	4 hr	......	......
-19ccc	.....do..........	52	.....	....	Opening in side of turbine	+.5	26.87	7- 9-48	T	E	900R	.....	......	242C	40.1
-19dcc	Harlan O'Brien...	61	.....	....	No measuring point.......	....	.....	....	T	G	900R	.....	......	1,100R	182.5
-19ddc	.....do..........	59	.....	....	Opening in side of turbine	+.5	31.43	6-22-48	T	G	450R	.....	......	1,100R	91.2
-20ab	Luther Lovejoy...	63	.....	....	Hole in base............	.0	36.70	7- 9-48	T	E	800R	.....	......	269C	39.6
-20acc	Harry Wilkie.....	...	.....	....	No measuring point.......	....	.....	....	HC	T	500R	.....	......	390R	35.9
-20ccc	Delbert Lewis....	...	24	....	Hole in base............	+.5	30.63	6-22-48	T	E	700R	.....	......	366C	47.2
-20ccd	.....do..........	...	.....	....	.....do..................	.0	28.95	6-29-48	T	E	857M	16.75	8 hr	610C	96.3
-20dcc	Hannon Bros......	...	.....	....	.....do..................	.0	27.17	6-29-48	T	T	500R	.....	......	140R	12.9

-20ddc	.....do.....	...	.....	....	No measuring point.....	....	.....	....	VC	G	......	.....	......	......	......
-21bab	.....do.....	...	.....	....	.....do.....	....	.....	....	T	E	1,050R	.....	......	237C	45.8
-21bca	.....do.....	...	.....	....	....	....	.....	....	T	E	1,000R	.....	......	298C	54.8
-21bcc	.....do.....	...	.....	....	No measuring point.....	....	.....	....	T	T	800R	.....	......	960R	141.5
-21ccb	O. W. Knight.....	...	24	....	Top of wooden base.....	+.5	27.92	6-22-48	T	E	652M	16.73	8 hr	473C	56.8
-21ccd	Martin Layne.....	...	.....	....	Edge of turbine base.....	.0	26.63	6-25-48	T	E	......	.....	......	......	......
-21dcb	Roy Watson.....	...	.....	....	Opening in side of turbine	+.5	25.62	6-25-48	T	E	903M	15.59	......	266C	44.2
-22bbc	Kentner.....	...	.....	....	No measuring point.....	....	.....	....	T	T	......	.....	......	......	......
-22bcc	Buetner.....	...	24	....	....	....	.....	....	T	E	......	.....	......	......	......
-22ccb	Roy Watson.....	64	24	....	Opening in turbine.....	....	.....	....	T	E	944M	.....	......	......	......
-22dbb	McGuire.....	...	.....	....	Hole in base.....	.0	23.95	6-29-48	T	E	1,000R	.....	......	70C	12.9
-22dbc	.....do.....	60	.....	....	.....do.....	+.5	22.20	6-29-48	T	E	850R	.....	......	121C	19
-22dcc	.....do.....	60	.....	....	.....do.....	+.5	25.05	6-29-48	T	T	1,200R	.....	......	250R	55.2
-23aab	Jay Mays.....	53	.....	....	No measuring point.....	....	.....	....	T	T	850R	.....	......	128R	20
-23bab	Fred Eickoff.....	63	.....	....	Top of steel frame.....	+.5	24.65	6-18-48	VC	T	600R	.....	......	294R	32.5
-23bbc	.....do.....	59	.....	....	Top of casing.....	+.5	24.37	6-18-48	T	G	800R	.....	......	......	......
-23bca	.....do.....	59	.....	....	Top of steel frame.....	+.5	23.70	6-18-48	VC	T	650R	.....	......	294R	35.2
-23bcb	.....do.....	60	.....	....	Hole in base.....	.0	22.52	6-18-48	T	G	800R	.....	......	294R	43.3
-23cba	Oagden.....	70	.....	....	.....do.....	.0	22.57	6-25-48	T	P	900R	.....	......	1,000R	166
-23dbc	Victor Hagenfeldt	50	.....	....	.....do.....	.0	20.63	6-21-48	T	E	1,100R	.....	......	304C	61.5
-23dcc	.....do.....	61	.....	....	.....do.....	+.5	18.26	6-21-48	T	T	1,000R	.....	......	......	......
-24acb	John Franke.....	62	.....	....	.....do.....	+1.0	22.64	7- 7-48	T	G	700R	.....	......	112R	14.4
-24bbc	.....do.....	71	.....	....	.....do.....	+.5	22.46	6-18-48	T	E	974M	11.40	5 hr	......	......
-24cbb	John Brenenman...	...	.....	....	.....do.....	.0	20.37	6-25-48	T	E	1,000R	.....	......	250C	46
-24ccd	Ed Wick.....	58	.....	....	.....do.....	.0	19.55	6-21-48	T	E	767M	13.12	......	......	......
-24cdc	Heiser.....	63	24	....	.....do.....	.0	17.42	6-17-48	T	T	700R	.....	......	192R	24.8
-24dab	Bill Jones.....	65	72-18	C	Bottom of turbine base...	.0	18.38	7- 7-48	T	E	......	.....	......	......	......
-24dbc	Carl Anderson.....	65	.....	....	No measuring point.....	....	.....	....	T	T	1,100R	.....	......	435R	88.2
-24dcc	Maughan.....	...	.....	....	Bottom of turbine base...	.0	17.18	6-22-48	T	T	650R	.....	......	405R	48.5
-25abc	English.....	65	72	C	Top of wood beam.....	+.5	16.76	7- 7-48	HC	G	1,000R	.....	......	600R	110.5
-25acc	Engelhardt.....	60	24	....	No measuring point.....	....	.....	....	T	T	1,000R	.....	......	630R	116.0
-25bbc	Lyhane.....	65	24	....	Opening in side of turbine	+1.0	17.10	7- 7-48	T	G	1,100R	.....	......	690R	139.7
-25ccc	Gus Holling.....	61	24	....	Hole in base.....	+1.0	17.66	6-21-48	T	G	1,103M	16.19	......	480R	88.5
-25dbc	Engelhardt.....	61	24	....	Top of casing.....	.0	16.16	7- 7-48	T	T	1,000R	.....	......	700R	129
-25dcc	.....do.....	60	18	....	Hole in base.....	+.5	16.07	7- 7-48	T	T	677M	10.65	4 hr	700R	80.5
-26abb	Adolph Rohrich...	...	.....	....	.....do.....	.0	19.37	6-18-48	T	T	1,180M	10.74	......	800R	160.5
-26bbc	Aogden.....	60	24	....	.....do.....	.0	21.29	6-17-48	T	T	1,200R	.....	......	1,000R	221
-26bcb	Rohrich.....	...	.....	....	.....do.....	.0	21.47	6-17-48	T	E	1,000R	.....	......	......	......
-26cb	.....do.....	68	.....	....	.....do.....	.0	22.40	6-18-48	T	T	1,000R	.....	......	800R	147.5
-26ccc	Loren Bilslend...	62	.....	....	.....do.....	.0	18.99	7- 8-48	T	P	1,000R	.....	......	540R	99.5
-26da	Neal Burmood.....	62	.....	....	Top of casing.....	.0	18.64	7-12-48	T	T	858M	9.81	6 hr	480R	70.02
-27aab	M. J. McGuire.....	50	24	....	Edge of turbine base.....	.0	23.69	6-25-48	T	E	500R	.....	......	370C	34.1
-27bbb	Martin Layne.....	56	24	....	Hole in base.....	.0	24.73	6-21-48	T	E	900E	.....	......	......	......
-27bda	M. J. McGuire.....	60	.....	....	.....do.....	.0	22.22	6-21-48	T	E	1,114M	14.27	......	516C	106
-27cbc	Carl Nelson.....	60	.....	....	.....do.....	.0	20.10	6-21-48	T	E	1,128M	11.02	......	584C	121
-27ccd	.....do.....	68	18	....	.....do.....	+.5	19.06	6-21-48	T	E	965M	19.06	......	207C	36.8
-28aca	Dave Schmidt.....	...	.....	....	No measuring point.....	....	.....	....	T	T	......	.....	......	......	......
-28acc	.....do.....	64	.....	....	Hole in base.....	.0	24.55	7-13-48	T	T	......	.....	......	......	......

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Hall County--Continued										
10-12-28bcd	Layne	57	.....	....	Bottom of steel plate	0.0	23.30	7-13-48	..	..	......	.....	......	......	......
-28bda	.....do	59	18	....	Hole in base	.0	24.34	7-13-48	T	T	......	.....	......	......	......
-28ccb	Don O'Brien	...	.....	....	Opening in side of turbine	+1.0	22.97	6-22-48	T	G	800R	.....	......	1,200R	177
-28db	Zenon Rivera	67	.....	....	.....do	+1.0	25.09	7-15-48	T	E	1,000R	.....	......	472C	87
-29aac	Carl Fines	63	24	....	Hole in base	+1.0	29.20	7-16-48	T	E	650R	.....	......	98C	11.7
-29abc	.....do	60	24	....	.....do	....	.....	....	T	E	650R	.....	......	362C	43.3
-29cab	Dan Hannon	...	.....	....	.....do	+.5	24.45	7-12-48	T	G	1,000R	.....	......	212R	39.1
-29dbb	F. A. Knight	61	.....	....	.....do	.0	23.10	7-12-48	T	T	900R	.....	......	336R	55.7
-29dca	J. Knight	57	72	C	Top of concrete curb	+1.0	23.52	7-12-48	HC	T	550R	.....	......	168R	17
-30aba	Bob Poole	53	.....	....	Top edge of steel plate	.0	28.74	7-14-48	T	G	800R	.....	......	56R	8.25
-30abc	.....do	57	.....	....	Opening in side of turbine	+.5	28.57	7-12-48	T	E	1,000R	.....	......	632C	116
-30bbb	B. O. Meyers	60	.....	....	Hole in base	+.5	28.05	6-22-48	T	E	813M	15.10	......	297C	44.5
-30cba	.....do	54	.....	....	.....do	.0	31.08	7-21-48	T	T	500M	.....	......	195R	18
-30cbb	.....do	51	24	....	Edge of steel plate	.0	24.43	6-22-48	T	T	......	.....	......	......	......
-30cbc	Platte Valley Academy	50	.....	....	Hole in base	+.5	23.47	6-22-48	T	T	600R	.....	......	300R	33.2
-30ccd	.....do	...	.....	....	.....do	+.5	23.84	7-20-48	T	T	1,000R	.....	......	100R	18.4
-30dca	Frank Ripp	50	.....	....	Top edge of steel plate	+1.0	23.72	7-13-48	T	T	450R	.....	......	360R	29.8
-30dcb	.....do	55	.....	....	Hole in base	+.5	23.08	7-15-48	T	T	900R	.....	......	360R	59.7
-31aab	....	52	.....	....	.....do	+.5	23.44	7-14-48	T	G	900R	.....	......	......	......
-31abd	Platte Valley Academy	52	.....	....	Top of casing	+.5	23.31	7-14-48	T	G	1,000R	.....	......	250R	46
-31acc	.....do	53	.....	....	Hole in base	+.5	21.81	7-16-48	T	NG	1,000R	.....	......	300R	55.2
-31bbc	Fred Wiseman	...	.....	....	.....do	+1.0	23.35	6-22-48	T	G	950R	.....	......	272R	47.6
-31ccb	.....do	...	.....	....	No measuring point	....	.....	....	T	NG	864M	.....	......	375R	55
-31ccc	.....do	...	.....	....	Hole in base	.0	19.05	6-22-48	T	NG	805M	12.05	......	630R	86.4
-31cd	.....do	...	.....	....	.....do	.0	20.56	6-22-48	T	NG	750R	.....	......	510R	70.4
-31dba	Platte Valley Academy	53	.....	....	.....do	.0	19.17	7-16-48	T	NG	928M	15.08	......	250R	39.7
-31ddc	.....do	55	.....	....	.....do	.0	16.79	6-22-48	T	T	1,000R	.....	......	70R	12.9
-32bac	R. L. Mackey	...	.....	....	....	....	.....	....	T	T	800R	.....	......	12R	1.77
-32bbb	Dan Hannon	...	.....	....	Hole in base	+1.0	22.58	6-22-48	T	T	1,000R	.....	......	252R	46.4
-32bbc	R. L. Mackey	...	.....	....	Opening in side of turbine	+1.0	22.33	6-22-48	T	G	913M	14.72	3 hr	800R	134.6
-32bda	.....do	...	.....	....	Hole in base	.0	20.44	6-22-48	T	T	1,000R	.....	......	108R	19.9
-32ccc	Ivan Urwiller	...	.....	....	Opening in side of turbine	+1.0	19.57	6-22-48	T	T	900E	.....	......	560R	92.8

-32dab	Dan Hannon	61	.....	....	Hole in base	.0	21.45	7-22-48	T	T	1,000R	.....	......	294R	54.1
-32dcb	J. J. Reynolds	...	.....	....	.....do	.0	18.30	7- 6-48	T	T	900E	.....	......	......	......
-33abb	Bill Hannon	59	.....	....	.....do	.0	19.43	7-13-48	T	T	950R	.....	......	1,080R	187
-33acc	.....do	...	.....	....	Top of casing	.0	20.17	6-23-48	T	T	1,100R	.....	......	1,080R	219
-33bbc	Don O'Brien	...	.....	....	No measuring point	....	.....	....	T	G	800R	.....	......	1,200R	177
-33bcd	.....do	...	.....	....	Top of casing	+1.0	22.55	6-23-48	T	G	800R	.....	......	1,200R	177
-33cac	Bill Hannon	...	.....	....	Hole in base	.0	22.13	6-23-48	T	T	1,200R	.....	......	1,080R	239
-33cdc	.....do	46	18	....	Top of casing	.0	20.63	7-13-48	..	..	1,100R	.....	......	1,080R	219
-33dcb	Harlan O'Brien	60	.....	....	No measuring point	....	.....	....	T	NG	839M	.....	......	1,100R	157
-33dcc	Ramsay	...	.....	....	.....do	....	.....	....	T	NG	928M	.....	......	720R	114.5
-34abc	Jim Pierce	59	.....	....	Opening in side of turbine	+.5	18.89	6-23-48	T	NG	731M	.....	......	960R	122.1
-34adc	W. P. Schoch	61	18	....	Hole in base	.0	19.25	7- 8-48	T	G	950R	.....	......	480R	84
-34bac	Edward Ostberg	61	.....	....	.....do	.0	22.54	7-16-48	T	E	1,059M	9.93	26 hr	1,129C	220
-34bcc	Ivan Urwiller	...	.....	....	No measuring point	....	.....	....	T	NG	708R	.....	......	800R	104.4
-34ccb	Clarence Otto	...	.....	....	.....do	....	.....	....	T	T	1,000R	.....	......	384R	70.7
-34dac	Rielly	60	.....	....	Hole in base	+.5	19.40	7- 8-48	T	T	1,200R	.....	......	490R	108
-34dbc	.....do	...	.....	....	Top of steel frame	.0	18.25	7- 8-48	VC	T	650R	.....	......	196R	23.5
-35cac	Earl Hammond	60	18	....	Opening in side of turbine	+.5	(a)	9- 1-48	T	G	1,100R	.....	......	210R	42.6
-35adc	Elmer Uhrich	57	.....	....	Hole in base	.0	16.60	7- 8-48	T	T	850R	.....	......	720R	113
-35bdc	Eldon Klimpert	60	18	....	.....do	+.5	18.20	7- 8-48	T	T	1,000R	.....	......	84R	15.5
-35cac	Bill Hannon	...	.....	....	Opening in side of turbine	+1.0	19.54	7- 8-48	T	G	900E	.....	......	......	......
-35cbb	Eldon Klimpert	...	.....	....	No measuring point	....	.....	....	T	T	1,000R	.....	......	144R	26.5
-35dbc	Rielly	58	.....	....	Hole in base	.0	18.20	7-13-48	T	T	1,000R	.....	......	585R	108
-35dcc	.....do	53	.....	....	Opening in side of turbine	+.5	19.59	6-21-48	T	T	1,000R	.....	......	810R	149
-36aab	Rathman	...	.....	....	No measuring point	....	.....	....	T	T	657M	.....	......	572R	64
-36adb	Art Lambrecht	57	.....	....	Hole in base	.0	14.53	7- 8-48	T	T	900E	.....	......	675R	112
-36bbc	Bredthauer	...	.....	....	.....do	.0	16.34	7-21-48	T	T	900R	.....	......	840R	139.4
-36bbd	.....do	55	.....	....	Top of pipe in base of turbine	+.5	16.64	7- 8-48	T	G	900R	.....	......	672R	111.5
-36ccc	Ben Boltz	58	.....	....	Hole in base	.0	16.87	7- 8-48	T	E	828M	16.43	14 days	311C	47.4
-36dcc	Bredthauer	...	.....	....	Top of pipe in base of turbine	+.5	18.55	7- 6-48	T	G	900E	.....	......	336R	55.7
-36ddc	Art Lambrecht	53	.....	....	Hole in base	.0	17.67	6-21-48	T	T	900E	.....	......	675R	112
11-11-31ccc	D. Stubblefield	65	18	GI	Top of casing	.0	29.86	6-14-48	T	E	900R	.....	......	363C	61
-31cdb	.....do	65	18	....	Hole in turbine side	+.7	35.39	6-14-48	T	E	750E	.....	......	361C	49.8
-31dcb	S. J. Shada	60	18	....	Hole in turbine base	.0	34.28	6-14-48	T	E	1,100R	.....	......	335C	67.8
11-12-2acc	P. A. Dibbern	70	24	....	.....do	.0	49.91	6-18-48	T	T	600R	.....	......	476R	52.6
-2db	Lawrie	77	18	....	.....do	.0	54.85	6-18-48	T	G	750R	.....	......	540R	74.6
-11bcb	K. Hinkson	66	18	....	.....do	+.5	52.27	6-18-48	T	E	350E	.....	......	335C	21.6
-11bcc	.....do	66	24	....	.....do	+.5	48.73	6-18-48	T	E	355M	12.22	......	366C	23.9
-14cbc	Alan Schuett	56	18	....	.....do	.0	35.11	6-18-48	T	G	355M	9.78	2 hr	315R	19.05
-15abb	Mrs. Lechner	80	18	....	.....do	.0	58.17	6-18-48	T	T	600R	.....	......	480R	53.1
-21adb	R. W. Boltz	60	18	....	.....do	+1.0	42.98	6-23-48	T	T	250R	.....	......	360R	16.6
-22dbb	James Ewing	60	18	.....	.....do	.0	31.64	6-24-48	T	T	700R	.....	......	240R	31
-23bbb	Alan Schuett	60	18	....	Opening in side of turbine	+.7	31.44	6-18-48	T	T	400E	.....	......	315R	23.2
-26ccc	J. L. Plejdrup	60	18	....	Hole in base	.0	28.70	6-22-48	T	T	859M	16.27	6 hr	400R	58.5

See footnote at end of table.

Table 5.--Records of irrigation wells in the Wood River unit, Nebr.--Continued

Location	Operator	Depth of well (feet)	Diameter of well (inches)	Type of casing	Measuring point: Description	Measuring point: Distance above (+) or below (-) surface	Depth to water below measuring point	Date of measurement	Kind of pump	Type of power	Yield (gpm)	Drawdown: Amount (feet)	Drawdown: Duration of test	1947 pumpage: Hours of operation	1947 pumpage: Total number of acre-feet pumped
					Hall County--Continued										
11-12-27acd	M. Schwartz......	53	18	....	End of discharge pipe....	+4.2	34.52	6-23-48	T	G	800R	.....	......	720R	106
-27bb1	.....do..........	60	18	....	Top of steel frame.......	.0	37.02	6-23-48	VC	T	500R	.....	......	......	......
-27bb2	.....do..........	60	24	....	Hole in base............	.0	33.03	6-23-48	T	G	800R	.....	......	720R	106
-27cc	Adolph Ahrens....	56	18	....	.....do..................	+.5	30.14	6-22-48	T	G	600R	.....	......	450R	39.7
-28abc	W. L. Crosser....	65	18	....	.....do..................	.0	32.03	6-24-48	T	G	400R	.....	......	450R	33.1
-28bab	Myles Dibbern....	59	18	....	Hole inside turbine head.	.0	38.76	6-23-48	T	T	314M	11.05	......	264R	14.15
-32caa	M. F. Dubbs......	50	18	....	No measuring point.......	....	30	Reported	T	E	250R	.....	......	742C	34.2
-32ddd	.....do..........	50	18	....	Opening in turbine.......	+1.0	28.39	6-21-48	T	E	550R	.....	......	915C	91.6
-33cbb	Wm. Dubbs........	47	18	....	.....do..................	+.5	28.54	6-21-48	T	E	240M	15.48	......	547C	24.2
-33cc	.....do..........	50	18	....	.....do..................	.0	27.73	6-21-48	T	E	550R	.....	......	392C	39.7
-33cbc	.....do..........	47	18	....	.....do..................	+1.0	28.58	6-21-48	T	E	600E	.....	......	493C	54.5
-33ddc	John Layher......	50	18	....	Hole in base............	.0	27.66	6-21-48	T	T	900R	.....	......	720R	119.5
-33cdc	Roy Schuetz......	50	18	....	....	....	34	Reported	T	E	350R	.....	......	540C	34.8
-34acd	Eldon E. Dubbs...	52	18	....	Hole in base............	.0	28.15	6-24-48	T	T	1,000R	.....	......	1,000R	184
-34bca	O'Neill..........	48	18	....	Top of casing...........	.0	28.66	6-23-48	VC	T	700R	.....	......	500R	64.5
-34ccb	J. B. Lyons......	53	18	....	No measuring point.......	....	23	Reported	T	T	900R	.....	......	252R	41.8
-34dbc	W. Livingston....	62	18	....	Hole in base............	.0	28.74	6-25-48	T	T	900R	.....	......	252R	41.8
-34dcd	Stutzman.........	60	18	....	.....do..................	.0	27.33	6-22-48	T	T	800R	.....	......	180R	26.5
-35acc	J. Ciemnozolowski	54	24	....	.....do..................	.0	32.91	6-24-48	T	T	700R	.....	......	450R	58
-35adc	Walter Thompson..	53	18	....	.....do..................	.0	28.73	6-24-48	T	T	750R	.....	......	300R	41.4
-35bdd	John Layher......	...	18	....	No measuring point.......	....	.....	....	T	T	700R	.....	......	98R	12.65
-35cdc	F. Gerhardtgoesch	55	18	....	.....do..................	....	.....	....	T	T	700R	.....	......	672R	86.6
-35dbb	Schwitzer........	57	24	....	Hole in base............	.0	32.44	6-24-48	T	T	750R	.....	......	750R	103.5
-36acc	E. F. Bahr.......	58	24	....	No measuring point.......	....	29	Reported	T	E	800R	.....	......	437C	64.4
-36bcc	Delbert Boshart..	54	18	....	Hole in base............	.0	30.90	6-24-48	T	T	600R	.....	......	450R	49.7
-36ccd	Delmar Perkins...	55	24	....	Hole under turbine.......	....	.....	....	..	..	......	.....	......	......	......
-36cd	Gus Holling......	...	.....	....	No measuring point.......	....	.....	....	T	T	1,000R	.....	......	720R	132.5
-36dcb	.....do..........	...	.....	....	.....do..................	....	.....	....	T	E	1,000R	.....	......	402C	74

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