

GEOLOGIC AND HYDROLOGIC DATA FROM  
A TEST-DRILLING PROGRAM IN THE HIGH  
PLAINS AREA OF SOUTH DAKOTA, 1979-80

By Carole L. Loskot, H. L. Case, III, and Dan G. Hern

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ABSTRACT

The High Plains aquifer system in south-central South Dakota comprises dune sands, the Ogallala Formation, the Arikaree Formation, and the White River Group. As part of the High Plains Regional Aquifer-System Analysis, a total of 29 test holes were drilled from 1979 to 1980 to aid in defining the geometry of the aquifer system. The information obtained from these drilling programs is presented in this report.

INTRODUCTION

The High Plains aquifer system (dune sands, the Ogallala Formation, and interbedded sandstones of the Arikaree Formation and White River Group) is the principal source of water for most domestic, municipal, and agricultural water users in the High Plains area of South Dakota. The ability of this aquifer system to continue to supply water to current users, and the capability of the aquifer system to sustain increased yields are important to the present and future economy of the area. In 1978, the U.S. Geological Survey began a 5-year study to describe the quantity and quality of the water resource and the operation of the High Plains regional aquifer hydrologic system.

As a first step towards describing the ability of the aquifer system to sustain current and future withdrawals, aquifer geometry, lithologic character, and saturated thickness must be determined. The purpose of this report is to present the data from a test-drilling program during 1979 and 1980 which was designed to improve the definition of the geometry of the High Plains aquifer system, particularly the base of the aquifer system, in South Dakota. The drilling program was also designed to provide water-level data which would supplement data from the U.S. Geological Survey - South Dakota Department of Water and Natural Resources observation-well network. In addition, the drilling program was to provide well cuttings for the definition of lithologic character and grain-size distribution of the sediments comprising the aquifer system.

Data in this report include brief geologic descriptions of well cuttings, measured water levels, land surface elevations, and well-completion records for the wells drilled as part of the study. Fourteen test holes were drilled in 1979 and 15 test holes were drilled in 1980; all but one of the wells were cased, screened, and used as observation wells.

Altitudes given in the report are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). NGVD is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level."

For readers who may prefer to use metric units rather than inch-pound units, the conversion factors for the terms in this report are listed below:

<u>Multiply</u>	<u>By</u>	<u>To obtain</u>
acre	0.4047	hectare
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer

### WELL- AND SITE-NUMBERING SYSTEMS

Each well or test hole for which data are given in the following tables has been assigned an identifying number based on its location with respect to the Federal land-survey system as it applies to South Dakota (fig. 1). The first three characters identify the township and its position north of the baseline. The second three characters identify the range and its position west of the meridian. The next one or two numbers identify the section. The following one to four letters indicate the quarter section (160 acres), quarter-quarter section (40 acres), quarter-quarter-quarter section (10 acres), and quarter-quarter-quarter-quarter section (2½ acres) in which the well is located. These letters are assigned in a counter-clockwise direction beginning with A in the northeast quarter. As shown in figure 1, well 37N26W16CCBD is located in the SE¼NW¼SW¼SW¼, Sec. 16, T. 37 N., R. 26 W.

The site-numbering system of the U.S. Geological Survey is based on the international latitude and longitude system. The number contains 15 digits. The first six digits denote the degrees, minutes, and seconds of latitude. The next seven digits denote degrees, minutes, and seconds of longitude. The last two digits are sequential numbers for wells within the stated 1-second square. The square gives the geographic location of the well and a unique number for each well.

The test holes were also given local well numbers for quick identification purposes. These local numbers are based on county and year drilled. For instance, well BT 80-1 was the first well drilled in Bennett County in the 1980 drilling program. Well SN 79-3 was the third well drilled in Shannon County in 1979.

### ACKNOWLEDGMENTS

The authors wish to thank the South Dakota Geological Survey for providing the Widco<sup>1/</sup> logging unit and instruction on its use, and the South Dakota Department of Water and Natural Resources for providing the 2-inch PVC casing and screen used in wells drilled during the 1980 program. They also wish to thank Marvin Knecht and James Goodman, South Dakota Department of Water and Natural Resources, for valuable advice on the hydrologic system.

Finally, the authors wish to thank the presidents and Tribal councils of the Ogallala and Rosebud Sioux tribes for granting permission to drill on Indian lands. Without their help, the data presented in this report, and the

<sup>1/</sup>The use of brand names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

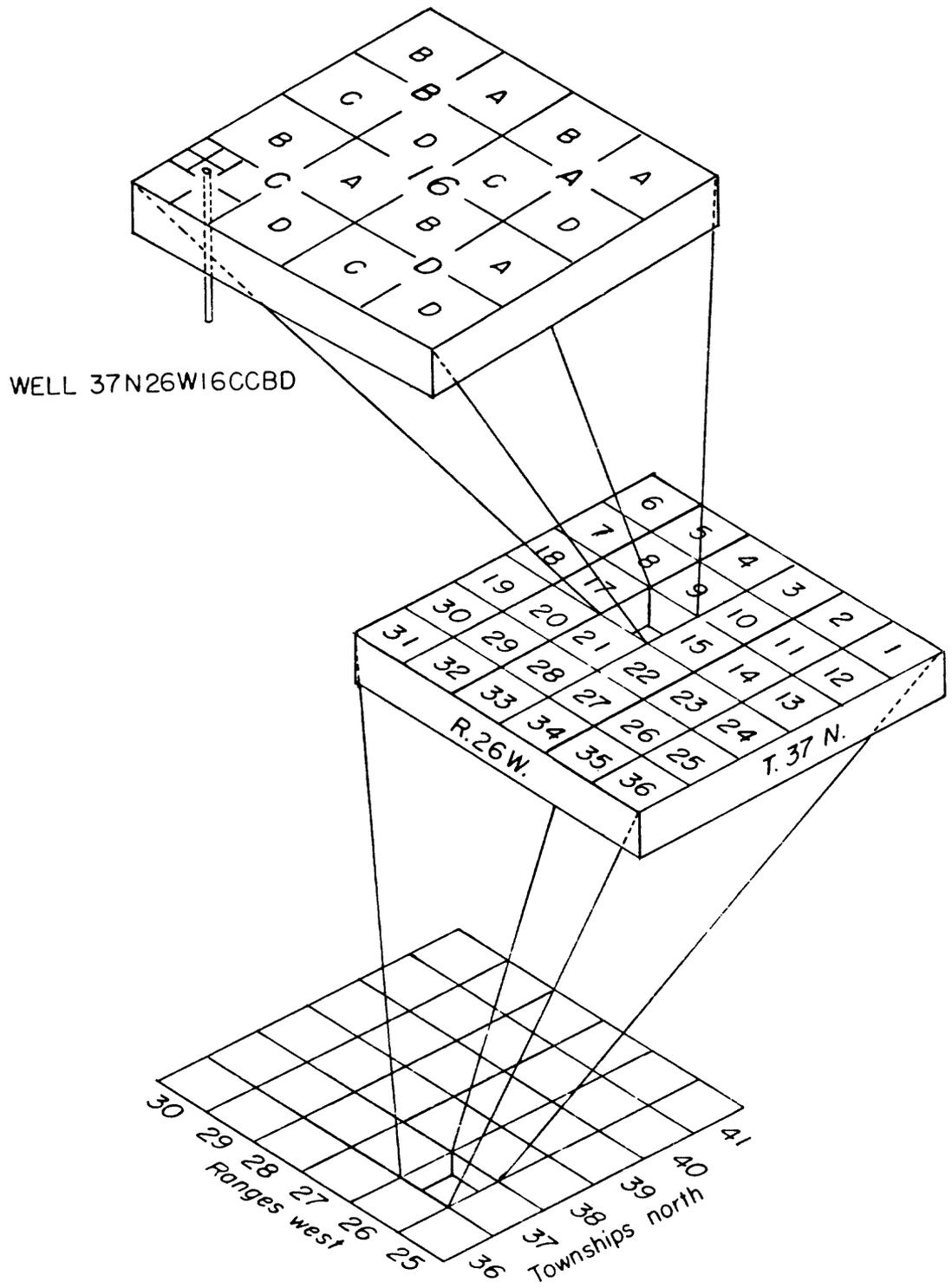


Figure 1.—Well-numbering system.

increased understanding of the hydrologic system gained from analysis of the data would not have been possible. Carole Ann Hart (Water Resources Director, Rosebud Sioux Tribe), and Anthony Whirlwind Horse (Bureau of Indian Affairs, Pine Ridge) provided valuable guidance during the "permission-granting" process.

## GEOLOGIC SETTING

The High Plains area in South Dakota consists of all or parts of Shannon, Bennett, Washabaugh, Todd, Mellette, Tripp, and Gregory Counties in the south-central part of the state. The geologic units in the area are Tertiary in age and include the Ogallala Formation, the Arikaree Formation, and the White River Group comprising the Brule Clay and the Chadron Formation. These names are adopted for use in South Dakota by the U.S. Geological Survey.

The Ogallala and Arikaree Formations are Miocene in age; the White River Group is Oligocene in age. The Ogallala is divided into two units. The upper unit is a light-colored, well-cemented, fine- to medium-grained, massive sandstone up to 150 feet thick and marked at the base by a bed of silty volcanic ash. The lower unit is composed of light-colored, poorly consolidated, silty clay to coarse sand up to 200 feet thick. The Arikaree comprises as much as 500 feet of light pinkish-tan silicified claystone, silty clay, siltstone, and poorly consolidated sandstone. It can be divided into five units in parts of South Dakota. The Brule Clay is the uppermost formation of the White River Group. It is composed of gray, brown, or cream-colored clays and silts up to 450 feet thick, interbedded with silty ash. The underlying Chadron Formation of the White River Group is a greenish-gray, silty bentonitic clay up to 120 feet thick.

## METHOD OF INVESTIGATION

Records for existing water wells and geophysical logs for water and oil-test wells were gathered and studied before drilling sites were selected. Potential drilling sites which would provide water-level and base-of-aquifer system data in sections of the study area for which no data were available were identified. If the potential sites were within the Pine Ridge or Rosebud Indian Reservations, permission to drill was obtained from the Tribal councils. The final sites selected for drilling are shown in figure 2.

Hydraulic rotary drills were used to drill the test holes for the High Plains project. The holes were 5 inches in diameter with the exception of three holes drilled in 1979. Wells 35N42W1CCDD and 36N39W5CDDD were 9 inches in diameter and well 38N38W22CBBB was a 7½-inch diameter hole. Most of the wells were drilled to the top of the Chadron Formation which was noted by the presence of green shale in the drill cuttings. In a few holes, drilling was stopped in the Brule Clay if at least a 40- to 60-foot thick clay section was encountered. The Ogallala Formation and its unconsolidated sands occasionally presented problems of loss of water circulation during drilling. To remedy this situation, a stabilizing agent, Revert, was added to the drilling mud during the 1979 drilling program to stabilize the sands.

Formation samples were collected during drilling in both 1979 and 1980. In 1979 a sample was collected every 10 feet of depth although the sample descriptions are

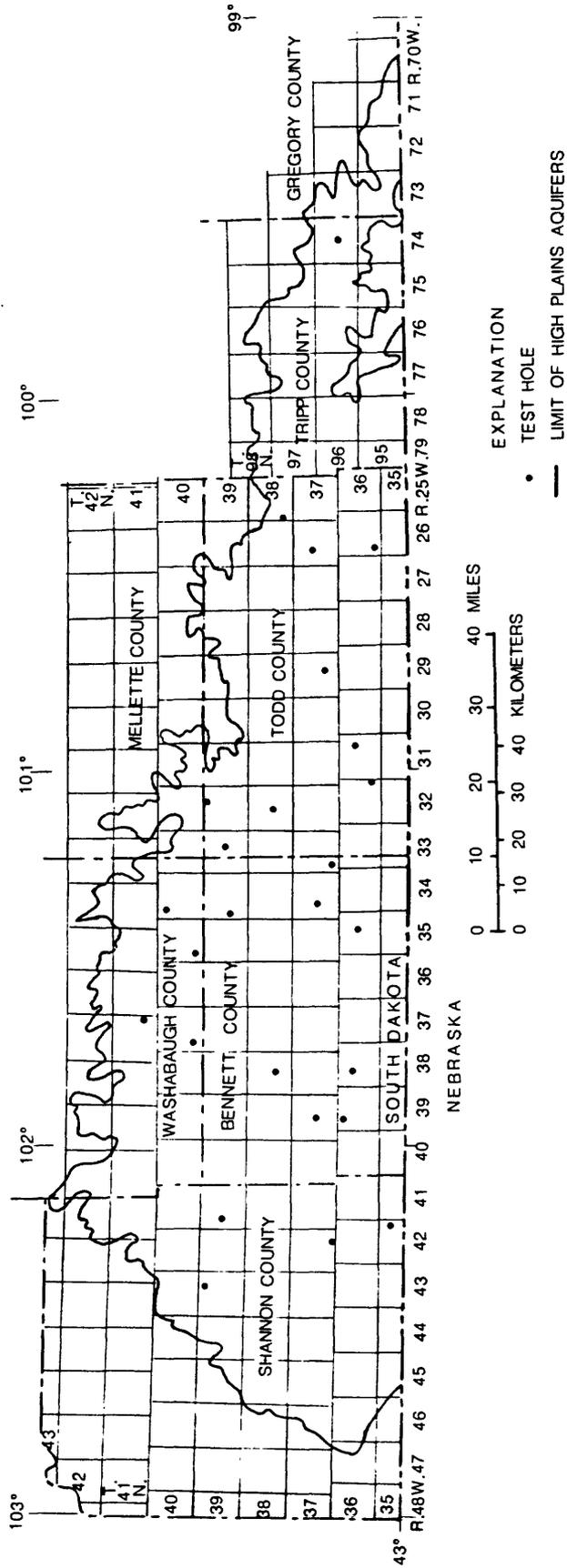


Figure 2.—High Plains area of South Dakota and locations of test holes drilled in 1979-80.

based on one drill stem length (20 feet). In 1980 only one sample was collected per drill stem length. Due to the similarity in the samples the wider sample spacing was felt to be sufficient at these locations. After collecting the samples, they were washed to eliminate the drilling mud, then described, and sacked. Two samples were collected at each point, the second sample being given to either the Rosebud or Pine Ridge Indian Reservations.

The test holes were logged using a portable Widco logger. The geophysical logs include resistivity, spontaneous potential (SP), and gamma ray. A test run was conducted while lowering the probe into the hole and any adjustments needed were generally made at this time. The final logging run was made while raising the probe. All runs were made at a rate of approximately 20 feet per minute. The geophysical logs may be examined or reproduced in the office of the U.S. Geological Survey, 237 Federal Building, Rapid City, South Dakota.

The wells were cased with 20-foot lengths of PVC casing. In 1979, 1½-inch casing was used; in 1980, 2-inch casing was used. Slotted casing was generally placed opposite the deepest "best" sands in the Arikaree. This eliminated duplication of the South Dakota Geological Survey observation well system as many of their wells were screened in the Ogallala Formation or upper Arikaree sands. The slots were hand-sawed and a 2-foot blank section was generally attached below the bottom slotted section. In 1979, the bottom section of casing was capped, while in 1980 a sand point was attached to the bottom section. The wells drilled during 1980 were gravel-packed. After the casing was secured in place with wire and stakes, the hole was backfilled with mud. The casings were cut off about 6 inches above ground level and capped. The casings were later permanently cemented in place.

The wells were developed after the casing was placed in the test holes and before the holes were backfilled with mud. In 1979, development was first attempted by pumping compressed air into the casing but pumping water proved to be more effective. Water was generally pumped into the casing until the water running out from around the casing ran fairly clear. In 1979, chlorine bleach was added to the wells during development to neutralize the Revert added during drilling. Water levels were measured after developing the wells. Slug tests were run on the wells drilled in 1979.

#### REFERENCES

Ellis, M. J. and Adolphson, D. G., 1971, Hydrogeology of the Pine Ridge Indian Reservation, South Dakota: U.S. Geological Survey HA-357, map and text.

Ellis, M. J., Ficken, J. H., and Adolphson, D. G., 1971, Hydrogeology of the Rosebud Indian Reservation, South Dakota: U.S. Geological Survey HA-355, map and text.

Table 1.—Logs of wells and test holes

Depths are given in feet below land surface; altitude is altitude of land surface, in feet, based on the National Geodetic Vertical Datum of 1929--formerly called mean sea level; the number in parentheses below the well number is a local field identification number (see pp. 2 and 3).

COUNTY: Bennett  
 WELL NUMBER: 36N34W36DBCC  
 (BT 80-5)  
 SITE NUMBER: 430256101160001  
 DATE COMPLETED: Sept. 19, 1980  
 DEPTH OF HOLE: 600  
 ALTITUDE: 2,930 (estimated  
 by altimeter)

CASING: 0-120 blank  
 120-140 slotted  
 140-160 blank  
 160-180 slotted  
 180-200 blank  
 200-205 sandpoint  
 AQUIFER: Ogallala  
 DEPTH TO WATER: 6.00 Oct. 27, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Topsoil; brown silt and sand.	20	20
Silt and sand, brown.	20	40
Silt and sand, light brown; white sandstone.	20	60
Silt, light brown; white siltstone; sand grains.	20	80
Silt and siltstone, light brown; white shale.	20	100
Siltstone, brown; some white siltstone.	60	160
Siltstone, light brown; few sand grains.	40	200
No sample description.	60	260
Silt and siltstone, light brown.	20	280
Silt and siltstone, light brown; some sand grains.	60	340
Silt and siltstone, brown; buff-colored sand.	20	360
Silt, brown; some fine-grained sand.	40	400
Silt, brown.	20	420
Siltstone, brown; buff-colored clay.	20	440
Siltstone, brown; about 1/3 pink clay.	20	460
Silt and siltstone, brown; some pink clay.	20	480
Siltstone, brown; pink clay; some white siltstone.	40	520
Siltstone, brown; gray, hard siltstone; clay; shale layer at 530 ft.	20	540
Silt and siltstone, brown; pink and gray clay.	40	580
Siltstone, brown; gray and pink clay.	20	600

COUNTY: Bennett  
 WELL NUMBER: 36N35W15CCCC  
 (BT 80-6)  
 SITE NUMBER: 430518101255001  
 DATE COMPLETED: Sept. 22, 1980  
 DEPTH OF HOLE: 520  
 ALTITUDE: 3,090

CASING: 0-120 blank  
 120-160 slotted  
 160-180 blank  
 180-185 sandpoint  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 0.33 Dec. 12, 1979  
 1.75 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, brown, medium-grained; few sandstone pieces.	20	20
Sand and sandstone, brown, medium-grained; some white siltstone.	20	40
Sand, sandstone, and siltstone, light brown; white clay and claystone.	20	60
Sand, sandstone, and siltstone, light brown; white siltstone and claystone.	20	80

WELL NUMBER: 36N35W15CCCC—Continued  
(BT 80-6)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt, siltstone, and sand, light brown; buff-colored clay and claystone.	20	100
Sand and sandstone, light brown; some silt and siltstone; some buff-colored clay and claystone.	20	120
Sand and silt, light brown; buff-colored clay and claystone.	20	140
Sand, silt, and siltstone, light brown; buff-colored clay and claystone; stream gravels.	20	160
Silt, siltstone, and fine-grained sand, light brown; white siltstone; buff-colored clay and claystone.	20	180
Siltstone and silt, brown; white siltstone; buff-colored claystone; possibly a few pieces of limestone.	20	200
Siltstone, silt, and clay, brown; white siltstone; small stream gravels.	20	220
Clay, silt, and siltstone, brown; white siltstone pieces.	80	300
Clay and silt, brown; some siltstone.	20	320
Clay, silt, and siltstone, brown; few pieces white siltstone.	80	400
Silt, siltstone, and clay, brown; some white sticky clay.	40	440
Silt, clay, and siltstone, brown; white sticky clay.	40	480
Silt, clay, and siltstone, brown; white sticky clay; stream gravels.	40	520

COUNTY: Bennett

WELL NUMBER: 36N38W9CCCC  
(BT 80-2)

SITE NUMBER: 430606101480101

DATE COMPLETED: Sept. 11, 1980

DEPTH OF HOLE: 360

ALTITUDE: 3,230

CASING: 0-220 blank

220-260 slotted

260-280 blank

280-285 sandpoint

AQUIFER: Arikaree

DEPTH TO WATER: 11.60 Oct. 27, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, light brown, medium-grained; traces of buff-colored siltstone.	40	40
Sand, light brown, medium-grained; siltstone; sandstone.	20	60
Sand, light brown; buff-colored siltstone and sandstone.	20	80
Sand, light brown to buff-colored; buff-colored siltstone and sandstone; some white sandstone.	20	100

WELL NUMBER: 36N38W9CCCC--Continued  
(BT 80-2)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand and sandstone, light brown to buff-colored; some white sandstone.	20	120
Sand and silt, light brown; some white sandstone; brown siltstone near bottom of stem.	20	140
Silt, brown; some siltstone, fine-grained sands, and white sandstone.	20	160
Silt and siltstone, brown; some white sandstone.	20	180
Silt and siltstone, brown; some buff-colored siltstone.	100	280
Siltstone and silt, brown; couple pieces white siltstone.	40	320
Siltstone and silt, brown; some white siltstone and sticky clay.	20	340
Silt, clay, and siltstone, brown; some white siltstone.	20	360

COUNTY: Bennett  
WELL NUMBER: 36N39W5CDDD  
(BT 79-3)  
SITE NUMBER: 430720101554501  
DATE COMPLETED: Nov. 11, 1979  
DEPTH OF HOLE: 502  
ALTITUDE: 3,500

CASING: Not cased  
AQUIFER:  
DEPTH TO WATER:  
AQUIFER: Not determined  
DEPTH TO WATER: Not measured

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and clay, alternating light to dark brown.	21	21
Sand, fine-grained, and silt, light-colored; some clay; changes to buff-colored, sticky clay and brown, silty clay.	15	36
Silt and clay, buff-colored, well-sorted.	40	76
Silt and clay, light brown; some fine sand; few siltstone pieces.	20	96
Clay and silt, alternating brown to buff-colored; some fine sand grains and light-colored clay.	21	117
Silt and clay, alternating brown- to buff-colored; some fine-grained sand and siltstone.	19	136
Silt and clay, light-colored.	19	155
Silt and clay, light brown.	19	174
Silt, unconsolidated; white, sticky clay; some sandstone and siltstone.	38	212
Silt and clay, light brown; some white clay and shale; fine sands.	21	233
Silt and clay, light brown; white clay and shale; fine sand.	20	253

WELL NUMBER: 36N39W5CDDD--Continued  
(BT 79-3)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and clay, light brown; some white clay and shale, fine sand, siltstone, and fine-grained sandstone.	80	333
Silt, light brown; white clay; fine-grained sand.	139	472
Silt and clay, light brown; some fine-grained sand and siltstone.	20	492
No sample description.	10	502
Drillstem broke on tough limestone bed, according to driller.		502

COUNTY: Bennett

WELL NUMBER: 37N33W32BBBB  
(BT 80-4)

SITE NUMBER: 430836101152201

DATE COMPLETED: Sept. 18, 1980

DEPTH OF HOLE: 540

ALTITUDE: 2,960

CASING: 0-60 blank

60-100 slotted

100-140 blank

140-145 sandpoint

AQUIFER: Ogallala

DEPTH TO WATER: 60.90 Oct. 28, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Topsoil; brown sand and silt.	20	20
Silt, brown; gray-colored clay lumps; some fine-grained sand.	20	40
Silt and siltstone, light brown; some clay lumps.	20	60
Silt and siltstone, light brown; some clay lumps; fine-grained sand.	20	80
Siltstone, light brown; some brown and gray clay.	40	120
Silt and siltstone, light brown; some brown clay.	20	140
Silt, light brown; some siltstone.	20	160
Siltstone, brown to gray; pink clay.	20	180
Siltstone, brown; some gray, sandy clay	60	240
Siltstone, brown; gray siltstone and clay.	60	300
Silt and siltstone, brown; white and pink clay.	20	320
Silt and siltstone, brown; white, pink, and gray clay.	40	360
Siltstone, brown to buff-colored; gray clay lumps.	20	380
Siltstone, brown to buff-colored; gray clay; some sand grains.	20	400
Siltstone, brown to gray; pink clay.	20	420
Silt, brown; some fine-grained sand.	20	440
Siltstone, brown to gray; some green sandstone.	20	460
Siltstone, brown to gray; gray and green clay; some green sandstone pieces.	60	520
Siltstone, brown; gray clays.	20	540

COUNTY: Bennett  
 WELL NUMBER: 37N34W20AAAA  
 (BT 79-1)  
 SITE NUMBER: 431010101211801  
 DATE COMPLETED: Oct. 22, 1979  
 DEPTH OF HOLE: 537  
 ALTITUDE: 2,956

CASING: 0-120 blank  
 120-140 slotted  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 0.33 Dec. 12, 1979  
 1.75 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, light-colored, well-sorted, medium-grained.	19	19
Sand, light brown, moderately well-sorted, medium- to fine-grained; some coarse-grained material.	15	34
Sand, light brown, fair to moderately well-sorted, fine- to medium-grained; some silts; a few pieces of fairly coarse-grained sandstone.	16	50
Clay and silt, grayish-brown, some fine-grained sand particles; a few lumps of sticky clay.	14	64
Clay and silt, reddish-brown, fine- to medium- grained sand; lumps of sticky, silty clay; a few small pieces of siltstone.	15	79
Clay and silt, light brown, small pieces of moderately to well-sorted siltstone and sandstone.	20	99
Silt and clay, light brown, fairly well-sorted, some siltstone; lumps of sticky clay.	20	119
Silt and siltstone, light brown, moderately well-sorted.	20	139
Silt and siltstone, light brown, moderately well- sorted; some semi-consolidated siltstone.	18	157
Silt, white to brown, moderately to well-sorted, some siltstone and semi-consolidated siltstone; some white clay.	80	237
Silt and clay, light brown, fairly well-sorted siltstone and semi-consolidated siltstone; white silt at the top of the joint, some red, fine-grained sandstone.	20	257
Silt, siltstone, fine-grained sandstone, and clay, light brown, fairly well-sorted.	20	277
Silt, siltstone, fine-grained sandstone and sand, and clay, light brown, fairly well-sorted.	20	297
Same as above with a piece of green, rounded siltstone.	20	317
Silt and siltstone, light brown, pink siltstone; some fine- to medium-grained sandstone.	20	337
Silt, siltstone, and semi-consolidated siltstone, light brown; white clay.	20	357
Silt and siltstone, light greenish-brown; white clay.	20	377
Clay and silt, light brown; fine sand grains; lumps of sticky clay; red mudstone; white clay.	39	416

WELL NUMBER: 37N34W20AAAA--Continued  
(BT 79-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Clay, silt, siltstone, and sandstone, light brown; white clay.	80	496
Clay, silt, siltstone, and sandstone, light brown; white clay; higher percentage of clays present than above.	40	536

COUNTY: Bennett  
WELL NUMBER: 37N39W16DDDD  
(BT 80-1)  
SITE NUMBER: 431030101560001  
DATE COMPLETED: Sept. 10, 1980  
DEPTH OF HOLE: 640  
ALTITUDE: 3,350

CASING: 0-500 blank  
500-540 slotted  
540-560 blank  
560-565 sandpoint  
AQUIFER: Arikaree  
DEPTH TO WATER: 26.61 Sept. 11, 1980  
24.80 Oct. 27, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt, siltstone, and claystone, buff-colored.	20	20
Silt and siltstone, buff-colored; some white claystone; sticky clay at bottom.	20	40
Silt and siltstone, brown to buff-colored; white and pink claystone; some sticky clay, couple pieces stream gravels.	20	60
Silt and siltstone, brown to buff-colored; white and pink claystone.	20	80
Silt and siltstone, brown to buff-colored; pink claystone; stream gravels.	20	100
Silt and siltstone, brown, white siltstone; stream gravels; few pieces light-colored claystone.	20	120
Siltstone, brown and white; stream gravels; one piece of white clay.	20	140
Silt and siltstone, brown; few pieces white siltstone; light-colored claystone; stream gravels.	20	160
Silt, siltstone, and clay, brown; some white and gray siltstone.	20	180
Silt and siltstone, brownish-gray; light-colored claystone.	20	200
Silt, siltstone, and clay, light brown; some white, sticky clay.	20	220
Silt, siltstone, and clay, brown; some white siltstone.	20	240
Silt and siltstone, brown; some clay; few pieces white siltstone.	20	260

WELL NUMBER: 37N39W16DDDD--Continued  
(BT 80-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone and silt, light brown; some white siltstone; few claystone pieces and stream gravels.	20	280
Silt and siltstone, light brown; buff-colored siltstone and clay.	20	300
Silt, clay, and siltstone, brown; white, sticky clay.	20	320
Silt, siltstone, and clay, light brown; some white siltstone and sticky clay.	20	340
Clay, white, sticky; some brown silt and siltstone; few pieces of white siltstone.	20	360
Silt and clay, brown; some siltstone; white, sticky clay.	20	380
Silt and clay, brown; some siltstone.	20	400
Silt and fine-grained sand, brown; small amount of white clay.	20	420
Silt, brown; some fine sand; few pieces white siltstone and clay.	20	440
Silt, brown; some light-colored siltstone and white clay pieces.	20	460
Silt and siltstone, brown; some buff-colored clay and siltstone.	20	480
Silt and fine-grained sand, brown; some white siltstone and sticky clay.	20	500
Silt and siltstone, light brown; white siltstone.	20	520
Silt, brown; white siltstone and clay.	20	540
Silt, brown; light-colored siltstone and silty clay.	20	560
Silt, brown; white siltstone and clay; red channel sands.	20	580
Silt, brown; some white siltstone and clay; red channel sands.	20	600
Silt and siltstone, brown; some white siltstone; fine red sand grains.	20	620
Silt, brown; white, sticky clay; some fine red sand grains.	20	640

COUNTY: Bennett  
 WELL NUMBER: 38N38W22CBBB  
 (BT 79-4)  
 SITE NUMBER: 431430101483001  
 DATE COMPLETED: Nov. 15, 1979  
 DEPTH OF HOLE: 584  
 ALTITUDE: 3,364 (estimated  
 by altimeter)

CASING: 0-285 blank  
 285-365 slotted  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 191.00 Dec. 10, 1979  
 189.10 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Topsoil; brown, silty clay.	23	23
Silt, siltstone, fine-grained sand, and clay, brown; some light-colored shale.	22	45
Silt and siltstone, brown; some clay, fine sand, and white limestone; alternating brown shale and limestone.	20	65
Silt and siltstone, brown; some clay, fine sand, buff-colored limestone, and brown shale.	20	85
Silt and limestone, brown; some shale.	20	105
Siltstone and clay, buff-colored.	40	145
Silt, brown, buff-colored clay; some siltstone.	20	165
Silt, brown to buff-colored; white limestone; fine sand grains; siltstone.	20	185
Silt, brown, and white limestone.	20	205
Clay, sticky, and siltstone.	20	225
Siltstone and silts, light brown; some sticky clay, limestone, and shale.	20	245
Silt and siltstone, light brown; some limestone and brown shale.	20	265
Silt and clay, brown; some siltstone and fine- grained sand.	20	285
Silt, siltstone, and clay, light brown; some white limestone.	40	325
Clay, silt, and shale, light brown; white limestone.	20	345
Clay, light brown, silty; some brown siltstone, white limestone; angular pieces of pink feldspar.	20	365
Clay, alternating pink and brown, sticky; some siltstone.	20	385
Clay, greenish-colored; reddish-colored silt and siltstone; white shale and clay.	20	405
Silt and clay; clay lumps.	19	424
No description.	20	444
Silt and clay, light brown; light-colored clay, shale, and siltstone.	20	464
Clay and silt, light brown; some white clay, brown shale, and light brown siltstone.	20	484
Clay, silty, siltstone, and silt, light brown; white limestone; buff-colored clay; fine-grained sandstone.	40	524
Clay, silt, and siltstone, light brown; light-colored clay and shale; brown siltstone.	20	544
Clay, silty, and siltstone, light brown; some white clay.	40	584

COUNTY: Bennett  
 WELL NUMBER: 39N34W19AAAA  
 (BT 80-3)  
 SITE NUMBER: 432025101223501  
 DATE COMPLETED: Sept. 17, 1980  
 DEPTH OF HOLE: 520  
 ALTITUDE: 2,820

CASING: 0-400 blank  
 400-440 slotted  
 440-460 blank  
 460-465 sandpoint  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 67.00 Oct. 28, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and sand, brown.	20	20
Silt and sand, brown; small pieces of white sandstone.	20	40
Siltstone, brown and gray; red sand; white clay.	20	60
Siltstone, brown; gray, white, and brown clay; some clear mineral, possibly mica.	20	80
Siltstone, brown; some gray siltstone.	60	140
Siltstone, brown; some gray siltstone and white sandstone.	60	200
Siltstone, light brown; some brown and red sand.	40	240
Siltstone, brown; some gray siltstone; gray clay lumps.	20	260
Siltstone, brown; some white siltstone and clay.	20	280
Siltstone, brown; some white siltstone and clay.	20	300
Siltstone, brown; some gray siltstone and clay.	60	360
Siltstone, brown; few gray siltstone pieces.	40	400
Silt and sand, brown.	20	420
Silt, siltstone, and sand, brown.	20	440
Silt and siltstone, brown.	20	460
Silt and siltstone, brown; shale at 470 ft.	20	480
Silt and siltstone, brown.	20	500
Silt and siltstone, brown; some gray and green shale.	20	520

COUNTY: Bennett  
 WELL NUMBER: 39N39W19DDBC  
 (BT 79-2)  
 SITE NUMBER: 431920101575001  
 DATE COMPLETED: Oct. 27, 1979  
 DEPTH OF HOLE: 572  
 ALTITUDE: 3,320 (estimated  
 by altimeter)

CASING: 0-220 blank  
 220-260 slotted  
 260-280 blank  
 280-300 slotted  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 147.60 Dec. 10, 1979  
 147.90 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and sand, light brown, moderately well-sorted; changes to buff-colored silt, sand, and fine-grained sandstone near bottom of stem.	19	19
Silt and clay, light brown to gray, well-sorted; some siltstone; white siltstone; yellow clay.	16	35

WELL NUMBER: 39N39W19DDBC--Continued  
(BT 79-2)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt, clay, and siltstone, alternating brown and white, well-sorted; yellow clay; fine-grained sand; color changes to predominantly brown near bottom of stem.	15	50
Silt, light brown, well-sorted; white clay.	89	139
Silt, light brown; some siltstone and fine-grained sand.	38	177
Silt and clay, light brown; some siltstone.	40	217
Silt and clay, light brown; some well-sorted siltstone and sandstone.	19	236
Silt and clay, light brown; fine-grained sandstone; white clay.	20	256
Silt and clay, light brown; light green sandstone; some channel sands.	58	314
Silt and clay, light brown; some siltstone, brown sandstone, and white clay.	37	351
Silt and clay, light brown; some sandstone and fine sand.	22	373
Silt, clay, siltstone, fine sand, and fine-grained sandstone, light brown, well-sorted.	39	412
Silt and clay, brown, well-sorted, some siltstone, fine sand.	20	432
Silt and clay, brown.	20	452
Silt, brown; some silty shale.	20	472
Sand, very fine-grained, and silt, brown; thin hard shale bed.	20	492
Shale, silty, silt, silty clay, and clay, brown; some fine- to very fine-grained sand.	20	512
Shale, blue-green, silty; fine- to very fine-grained sand; brown silt.	20	532
Shale, blue-green, sticky, silty.	20	552
Shale, blue-green, silty; blue-green to black, hard shale.	20	572

COUNTY: Shannon  
WELL NUMBER: 35N42W1CCDD  
(SN 79-3)  
SITE NUMBER: 430200102130001  
DATE COMPLETED: Nov. 13, 1979  
DEPTH OF HOLE: 379  
ALTITUDE: 3,534 (estimated  
by altimeter)

CASING: 0-160 blank  
160-180 slotted  
180-200 blank  
200-260 slotted  
266-280 blank  
AQUIFER: Arikaree  
DEPTH TO WATER: 31.20 Dec. 10, 1979  
30.14 Apr. 21, 1980  
30.50 June 8, 1981

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, light-colored, well-sorted, unconsolidated.	20	20

WELL NUMBER: 35N42W1CCDD--Continued  
(SN 79-3)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, well-sorted; white silt and shale.	20	40
Silt and clay, alternating white, brown to light-colored; some siltstone and shale; clays are fairly sticky.	20	60
Sand, shale, and siltstone, light brown.	20	80
Silt and clay, light brown, well-sorted; some sandstone.	20	100
Silt and clay, light brown; some siltstone, light-colored clay, red shale, and fine sand grains.	20	120
Silt and clay, buff-colored, slightly more consolidated than above; some siltstone, red shale, and fine sand grains.	20	140
Silt and clay, alternating, light brown; some siltstone, fine sand grains; some greenish, silty clay near bottom.	20	160
Silt, clay, and siltstone, light brown; some shale and white clay.	20	180
Clay, siltstone, and claystone, alternating light brown and buff-colored.	59	239
Silt, siltstone, and fine sand, light brown, poorly sorted; white to buff-colored clay.	20	259
Silt, light brown; some clay lumps and siltstone.	20	279
Silt, fine sand, and siltstone, light brown; some shale.	20	299
Silt and clay, light brown; some shale and fine-grained sands.	40	339
Silt and shale, light brown; hard siltstone, some clay.	20	359
Shale, light brown, silty; white clay; few pieces of blue-gray clay.	20	379

COUNTY: Shannon  
WELL NUMBER: 37N42W35CCDC  
(SN 80-1)  
SITE NUMBER: 430748102154801  
DATE COMPLETED: Sept. 9, 1980  
DEPTH OF HOLE: 600  
ALTITUDE: 3,447

CASING: 0-420 blank  
420-480 slotted  
480-500 blank  
500-505 sandpoint  
AQUIFER: Arikaree  
DEPTH TO WATER: 105.15 Sept. 11, 1980  
114.70 Oct. 27, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, silty, and well-cemented sandstone, light-colored; some clay.	20	20
Silt, siltstone, and clay, light brown.	20	40
Siltstone; some clay and silt.	20	60

WELL NUMBER: 37N42W35CCDC--Continued  
(SN 80-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, light brown; some claystone.	20	80
Clay, light-colored; some siltstone, sandstone, and silt.	20	100
Silt, siltstone, and sticky clay, brown.	20	120
Siltstone, silt, clay, claystone, and shale, light brown.	20	140
Silt, clay, and siltstone, brown; light-colored clay; fine-grained sandstone.	20	160
Silt and siltstone, light brown; gray siltstone; some light-colored clay and claystone.	20	180
Siltstone and sticky, silty clay, brown; light- colored clay and claystone.	20	200
Siltstone and silt, brown; light-colored sticky clay and claystone.	20	220
Clay and siltstone, brown; light-colored clay.	20	240
Siltstone, brown; light brown, sticky clay; light-colored to white clay.	20	260
Clay, light brown; brown, fine-grained sandstone; some silt and siltstone.	20	280
Silt and siltstone, brown; light-colored clay.	20	300
Siltstone, light brown; light-colored clay and claystone; some silt.	20	320
Siltstone, brown; some clay, white claystone, and limestone at 340 ft.	20	340
Limestone, white; brown clay; gray siltstone; hard drilling.	20	360
Limestone, white; brown and gray siltstone; brown, sticky clay.	20	380
Silt and siltstone, brown; gray and light green sandstone; light-colored clay; black stream gravel; some gray limestone.	20	400
Silt and clay, brown; white limestone; fine- grained sandstone.	20	420
Silt, brown; white limestone; brownish-gray siltstone and clay; light brown clay; black unidentified fragment.	20	440
Silt, brown; some siltstone, white limestone, sticky clay, and claystone; piece of black slate.	20	460
Silt and siltstone, brown; white, sticky clay; white limestone; black slate.	20	480
Siltstone, brown; white, sticky clay; white limestone; black slate.	20	500
Silt, brown, sticky clay; siltstone; white limestone; black slate.	20	520
Silt, clay, and siltstone, brown.	20	540
Silt and clay, brown; some siltstone.	20	560
Silt and sticky clay, brown; some siltstone.	20	580
Clay, brown, silty; clay lumps.	20	600

COUNTY: Shannon  
 WELL NUMBER: 39N41W17BCCC  
 (SN 79-2)  
 SITE NUMBER: 432120101120001  
 DATE COMPLETED: Oct. 25, 1979  
 DEPTH OF HOLE: 399  
 ALTITUDE: 3,156 (estimated  
 by altimeter)

CASING: 0-180 blank  
 180-200 slotted  
 200-220 blank  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 38.90 Dec. 10, 1979  
 38.42 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and clay, light brown.	20	20
Silt and clay, light brown; fair to well-rounded stream gravels; poorly sorted.	16	36
Clay and silt, brown, alternating with buff-colored siltstone; few pieces of reddish-brown shale.	15	51
Clay, silt, and siltstone, light brown, fairly well-sorted.	15	66
Clay and silt, light brown, well-sorted; white siltstone.	73	139
Silt and clay, light brown, well-sorted; some siltstone.	19	158
Clay, silt, and siltstone, light brown, well-sorted; few pieces of white clay.	60	218
Silt, siltstone, fine-grained sand, and clay, light brown, well-sorted; couple pieces of white clay.	22	240
Silt, light brown; brown sand and clay; some siltstone.	20	260
Silt, clay, and fine-grained sandstone, light brown.	20	280
Silt and fine-grained sand, light brown, fairly well-sorted; some clay, siltstone, and fine-grained sandstone.	19	299
Silt and clay, light brown; some fine-grained sand and siltstone.	20	319
Clay and silt, alternating red, brown, gray, and green, moderately well-sorted; some brown, fine-grained sand.	20	339
Clay and silt, alternating red, brown, gray, and green; some brown, fine-grained sand; changes to brown clay and silt with some white clay.	20	359
Clay and silt, alternating brown, gray, and white, well-sorted.	20	379
Clay and silt, alternating gray, green, white, and tan.	20	399

COUNTY: Shannon  
 WELL NUMBER: 39N43W2BA  
 (SN 79-1)  
 SITE NUMBER: 432251103221001  
 DATE COMPLETED: Oct. 24, 1979  
 DEPTH OF HOLE: 198  
 ALTITUDE: 2,990

CASING: 0-20 blank  
 20-120 slotted  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 33.60 Dec. 10, 1979  
 33.74 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt, light brown, well-sorted; some clay.	20	20
Clay and silt, light brown, poorly sorted; stream gravels, quartz pebbles, and siltstone.	16	36
Clay, light brown, poorly sorted; fairly rounded stream gravels; some silt, siltstone, and white clay.	15	51
Clay and silt, tan; few pieces of rounded stream gravels.	15	66
Clay and silt, tan, fairly well-sorted; some siltstone and white clay.	15	81
Clay and silt, tan, fairly well-sorted; some siltstone and white clay; more brown silt near bottom of joint.	20	101
Silt, clay, and siltstone, light brown, fairly well-sorted; some white clay; green-gray clay near bottom of joint.	20	121
Clay, fairly well-sorted, alternating pink and green; some reddish-brown shale; some siltstone.	19	140
Clay, alternating green and red, fairly well-sorted; some siltstone.	18	158
Silt and clay, red-brown; green silt and clay; some siltstone.	40	198

COUNTY: Todd  
 WELL NUMBER: 36N26W31ADD  
 (TD 80-4)  
 SITE NUMBER: 430310100245501  
 DATE COMPLETED: Sept. 25, 1980  
 DEPTH OF HOLE: 360  
 ALTITUDE: 2,620

CASING: 0-60 blank  
 60-100 slotted  
 100-120 blank  
 120-125 sandpoint  
 AQUIFER: Ogallala  
 DEPTH TO WATER: 29.36 Oct. 29, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone, light tan; layers of silt.	60	60
Sandstone, tan; carbonate; greenish silt, and sand.	20	80
Siltstone, light brown; brown, fine-grained sand begins at about 90 ft.	20	100
Siltstone, light brown; brown, fine-grained sand.	20	120
Siltstone, light brown to tan.	60	180

WELL NUMBER: 36N26W31ADD--Continued  
(TD 80-4)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, brown; green, black, and tan sands; some white ash; hard drilling.	60	240
Silt and siltstone, brown; some gray siltstone.	20	260
Siltstone, brown; white clay.	40	300
Siltstone, brown; gray clay; some pink clay.	60	360

COUNTY: Todd

WELL NUMBER: 36N31W14BAAA  
(TD 79-2)

SITE NUMBER: 430613101561701

DATE COMPLETED: Oct. 16, 1979

DEPTH OF HOLE: 259

ALTITUDE: 2,955

CASING: 0-120 blank

120-160 slotted

AQUIFER: Arikaree

DEPTH TO WATER: 138.80 Dec. 11, 1979

137.50 Apr. 22, 1980

137.50 July 8, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone, light-colored, fine-grained; some dark-colored particles.	19	19
Sandstone, light-colored, fine-grained; some dark-colored sandstone.	15	34
Clay, light-colored; fine-grained sandstone at 40 ft.	15	49
Clay, sticky, and silt, light-colored; fine-grained sandstone.	15	64
Clay, silt, and fine-grained sandstone, light- colored; white sticky clay.	15	79
Clay, silt, sand, and fine-grained sandstone, light-colored; white, sticky clay.	20	99
Silt, sand, and fine-grained sandstone, light- colored; sandier than above.	20	119
Silt, sand, and fine-grained sandstone, light- colored; some dark grains.	20	139
Sand and silt, light-colored; some sandstone; some dark mineral grains.	18	157
Silt and clay, white; some white sticky clay; small fragments of green mudstone begin about 170 ft.	20	177
Siltstone, sand, and clay, light-colored; small fragments of green mudstone.	20	197
Sand, fine-grained, and silt, light-colored.	21	218
Clay and silt, red; white clay; some sandstone pieces.	41	259

COUNTY: Todd  
 WELL NUMBER: 36N32W25DDDD  
 (TD 80-2)  
 SITE NUMBER: 430340101012301  
 DATE COMPLETED: Sept. 23, 1980  
 DEPTH OF HOLE: 500  
 ALTITUDE: 2,841

CASING: 0-80 blank  
 80-120 slotted  
 120-125 sandpoint  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 9.80 Oct. 29, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, silty, and clay, light tan, very fine- to fine-grained.	20	20
Sand, gray, medium-grained.	60	80
Sand, gray, medium-grained, becoming somewhat consolidated at 95 ft.	20	100
Sand, gray, medium-grained; light tan clay, fine-grained sandstone, and siltstone.	20	120
Sand, brown, coarse-grained, hard drilling.	20	140
Sand, brown, fine- to very coarse-grained.	20	160
Siltstone, brown.	200	360
Siltstone, brown; fine-grained sand.	20	380
Sand, fine-grained, silt, and siltstone, brown.	20	400
Siltstone and very fine-grained sand, brown and tan.	20	420
Siltstone, brown and tan.	20	440
Siltstone, brown and tan; some multi-colored, coarse-grained, quartz sand.	60	500

COUNTY: Todd  
 WELL NUMBER: 37N26W16CCBD  
 (TD 79-1)  
 SITE NUMBER: 431020100243501  
 DATE COMPLETED: Oct. 15, 1979  
 DEPTH OF HOLE: 137  
 ALTITUDE: 2,536 (estimated  
 by altimeter)

CASING: 0-97 blank  
 97-137 slotted  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 11.00 Dec. 11, 1979  
 11.14 Apr. 22, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone, whitish-gray.	19	19
Sand and sandstone, fine-grained; some white fine-grained sandstone and dark-colored minerals.	15	34
Clay, light brown, partially integrated; piece of limestone.	30	64
Mudstone and clay, brown and gray; buff- colored clay.	35	99
Siltstone and clay, brown and some white.	38	137

COUNTY: Todd  
 WELL NUMBER: 37N29W22CCCC  
 (TD 80-3)  
 SITE NUMBER: 430959100444001  
 DATE COMPLETED: Sept. 24, 1980  
 DEPTH OF HOLE: 520  
 ALTITUDE: 2,881

CASING: 0-220 blank  
 220-260 slotted  
 260-265 sandpoint  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 98.95 Oct. 29, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone, light tan to light gray; some white volcanic ash.	20	20
Sandstone, light tan to light gray.	80	100
Sandstone, light tan; light green sand; some carbonate.	20	120
Sandstone, light tan to gray, fine-grained.	40	160
Sand, gray, with multi-colored specks, fine- to medium-grained.	20	180
Sand, brown, fine-grained.	40	220
Siltstone, light brown; fine-grained, silty sand.	20	240
Siltstone, light brown to tan.	40	280
Siltstone, reddish-brown and some tan.	20	300
Siltstone, reddish-brown; some clay.	20	320
Siltstone, brown; multi-colored, coarse-grained sand.	20	340
Siltstone and very fine-grained sand, brown; some multi-colored, coarse-grained sand.	40	380
Siltstone, buff-colored; tan sandstone.	40	420
Siltstone, buff-colored, pink and green, coarse-grained sand; small clay or ash balls.	20	440
Siltstone, buff-colored; greenish-gray limestone layer at about 452 ft; small particles of light-colored ash.	20	460
Siltstone, buff-colored; ash; multi-colored, coarse-grained sand.	20	480
Sand, multi-colored, medium- to very coarse-grained; limestone; siltstone; very fine-grained sand.	40	520

COUNTY: Todd  
 WELL NUMBER: 38N25W30BBBB  
 (TD 80-5)  
 SITE NUMBER: 431430100195901  
 DATE COMPLETED: Sept. 25, 1980  
 DEPTH OF HOLE: 340  
 ALTITUDE: 2,500

CASING: 0-80 blank  
 80-120 slotted  
 120-140 blank  
 140-145 sandpoint  
 AQUIFER: Arikaree  
 DEPTH TO WATER: 29.20 Oct. 29, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Topsoil; sand; some sandstone.	20	20

WELL NUMBER: 38N25W30BBBB—Continued  
(TD 80-5)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone; gray, silty clay lumps.	40	60
Silt and siltstone, brown; gray clay.	60	120
Siltstone, brown; gray clay; some brown sand.	20	140
Siltstone, light to dark brown.	40	180
Siltstone, light to dark brown; white clay lumps.	100	280
Shale, gray and green; brown siltstone.	20	300
Shale, gray and green.	40	340

COUNTY: Todd  
WELL NUMBER: 38N32W21ADBB  
(TD 79-3)  
SITE NUMBER: 431514101061101  
DATE COMPLETED: Oct. 17, 1979  
DEPTH OF HOLE: 79  
ALTITUDE: 2,820

CASING: 0-20 blank  
20-40 slotted  
40-50 blank  
AQUIFER: Arikaree  
DEPTH TO WATER: 30.00 Dec. 11, 1979  
30.25 Apr. 22, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and sand, light-colored; dark mineral grains.	19	19
Sandstone, fine-grained; red clay; whitish sandstone; some limestone.	30	49
Clay, reddish-brown; some fine-grained sandstone.	30	79

COUNTY: Todd  
WELL NUMBER: 39N32W3AAAA  
(TD 80-1)  
SITE NUMBER: 432310101045501  
DATE COMPLETED: Sept. 23, 1980  
DEPTH OF HOLE: 280  
ALTITUDE: 2,610

CASING: 0-80 blank  
80-120 slotted  
120-125 sandpoint  
AQUIFER: Arikaree  
DEPTH TO WATER: 36.25 Oct. 28, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, light brown, with multi-colored sand grains; some bentonite.	20	20
Siltstone, light brown to buff-colored; very fine-grained sand.	20	40
Siltstone, light brown to buff-colored; layers of tan, soft clay.	20	60
Siltstone, light brown; layers of buff-colored, harder siltstone.	60	120

WELL NUMBER: 39N32W3AAAA--Continued  
(TD 80-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, light brown, with buff-colored, harder siltstone layers; light tan-colored clay.	20	140
Siltstone, light brown, with buff-colored, harder siltstone layers; light brown clay; below 150 ft changes to light brown to buff-colored clay containing black particles.	20	160
Clay, tan; layers of buff-colored siltstone.	40	200
Siltstone, light brown to buff-colored; clay layers.	20	220
Shale, multi-colored, alternating hard and soft layers.	60	280

COUNTY: Todd  
WELL NUMBER: 39N33W15DDDD  
(TD 79-4)  
SITE NUMBER: 432044101115201  
DATE COMPLETED: Oct. 18, 1979  
DEPTH OF HOLE: 426  
ALTITUDE: 2,800

CASING: 0-300 blank  
300-340 slotted  
340-360 blank  
AQUIFER: Arikaree  
DEPTH TO WATER: 19.80 Dec. 11, 1979

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and clay, light brown; fine-grained sandstone.	19	19
Clay, silt, and sand, light reddish-brown; changes to sandstone and brown clay below.	15	34
Sandstone; white clay.	30	64
Clay, silt, and sand, brown; clay lumps; friable sandstone.	15	79
Sand, clay, and silt, light brown; some clay lumps.	20	99
Sand, sandstone, clay, and silt, light brown; some clay lumps.	20	119
Clay, silt, and sand, brown; some clay lumps; some sandstone.	20	139
Clay, silt, and sand, brown; clay lumps.	20	159
Clay, sand, and silt, light brown; white clay lumps; some sandstone.	58	217
Clay, silt, sand, and sandstone, light brown; white clay lumps; some brown, sticky clay.	21	238
Clay, silt, and sand, light brown; white, sticky clay; brown clay; some sandstone pieces.	20	258
Siltstone; sandstone; sticky clay lumps.	20	278
Clay, silt, and mudstone, light-colored; white clay.	20	298
Clay, silt, and siltstone, light-colored; brown and white clay lumps; some stream gravels.	39	337

WELL NUMBER: 39N33W15DDDD--Continued  
(TD 79-4)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Clay, sand, and silt, light brown to reddish-colored; sticky clay lumps; some siltstone; possibly some red feldspar particles.	40	377
Shale, silty, at top of joint; changes to brownish-green clay below; white, sticky clay; some sand particles.	20	397
Clay, green to greenish-brown, poorly sorted; some silt, fine-grained sand, and red shale particles.	29	426

COUNTY: Tripp	CASING: 0-15 blank
WELL NUMBER: 96N74W16DDDD	15-35 slotted
(TR 79-1)	AQUIFER: Arikaree
SITE NUMBER: 430732099353201	DEPTH TO WATER: 15.20 Dec. 11, 1979
DATE COMPLETED: Oct. 12, 1979	11.56 Apr. 22, 1980
DEPTH OF HOLE: 119	
ALTITUDE: 2,342	

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sandstone, well-cemented, and soft, sandy clay, buff-colored; sand consists of angular to subangular quartz and feldspar grains.	19	19
Clay, green and brown, soft, sticky, with very little sand.	30	49
Clay, brown, sticky.	15	64
Clay, reddish-brown.	15	79
Clay, brownish-gray, with some oxidation.	20	99
Siltstone, orange-brown; gummy gray-brown clay; some dark red, soft clay.	20	119

COUNTY: Washabaugh	CASING: 0-120 blank
WELL NUMBER: 40N34W6DDDD	120-160 slotted
(WA 80-1)	160-180 blank
SITE NUMBER: 432740101223501	180-185 sandpoint
DATE COMPLETED: Sept. 12, 1980	AQUIFER: Arikaree
DEPTH OF HOLE: 400	DEPTH TO WATER: 33.35 Oct. 28, 1980
ALTITUDE: 2,620	

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt, siltstone, and clay lumps, brown.	20	20
Silt and siltstone, brown; some buff-colored clay lumps.	20	40

WELL NUMBER: 40N34W6DDDD--Continued  
(WA 80-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone and silt, brown; some buff-colored, well-indurated siltstone; white, sticky clay lumps.	20	60
Siltstone, brown; some silt; some buff-colored siltstone and white, sticky clay.	20	80
Siltstone, brown; some silt; some buff-colored siltstone and clay lumps.	20	100
Siltstone, brown; buff-colored clay lumps.	20	120
Siltstone, brown; buff-colored sandstone and clay.	20	140
Siltstone, brown; buff-colored sandstone; some buff-colored clay.	20	160
Clay, buff-colored to brown; brown siltstone.	20	180
Clay and clay lumps, buff-colored to brown; brown siltstone.	20	200
Clay, buff-colored, sticky; some brown siltstone.	20	220
Siltstone, gray; buff-colored sandstone and clay lumps; some green and blue clay.	20	240
Clay, light brown to gray; some blue sandstone.	20	260
Clay and siltstone, gray; brown sandstone; some green shale.	20	280
Siltstone, brown to gray; some green siltstone; white, sticky clay.	20	300
Clay, brown and gray; some green siltstone.	20	320
Clay, gray and green; some brown siltstone.	20	340
Clay, gray and green; some brown and gray siltstone.	20	360
Clay, gray and green; some brown, gray, and green siltstone.	40	400

COUNTY: Washabaugh  
WELL NUMBER: 40N35W31AAAA  
(WA 80-3)  
SITE NUMBER: 432410101294001  
DATE COMPLETED: Sept. 16, 1980  
DEPTH OF HOLE: 500  
ALTITUDE: 2,620

CASING: 0-280 blank  
280-320 slotted  
320-325 sandpoint  
AQUIFER: Arikaree  
DEPTH TO WATER: 51.95 Oct. 28, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Topsoil; brown silt.	20	20
Silt and siltstone, brown; some white clay.	20	40
Silt and siltstone, brown; white clay.	20	60
Siltstone, brown; white clay.	40	100
Siltstone, brown; white clay; some red sand.	20	120
Siltstone, light brown; white clay; some red sand.	20	140
Clay, light brown; some brown and white siltstone.	60	200

WELL NUMBER: 40N35W31AAAA--Continued  
(WA 80-3)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, light brown; gray clay; some bright red and black siltstone.	20	220
Siltstone, light brown; some gray siltstone and clay.	20	240
Siltstone, light brown; gray clay.	20	260
Siltstone, light brown; gray clay; some bright red sandstone pieces.	20	280
Shale and clay, gray; some brown siltstone.	40	320
Siltstone, light brown; gray clay; some green shale and clay.	20	340
Shale and clay, gray; some green and blue clay.	20	360
Shale, light brown to gray; green and blue clay.	40	400
Silt and siltstone, light brown; some gray and green silt and siltstone.	20	420
Shale and siltstone, light brown and gray.	20	440
Silt, shale, and clay, gray; some light brown siltstone; some brown clay.	40	480
Silt and siltstone, brown and gray; gray clay; some blue, green and gray siltstone.	20	500

COUNTY: Washabaugh  
WELL NUMBER: 40N37W30DDDD  
(WA 79-1)  
SITE NUMBER: 430055101440001  
DATE COMPLETED: Oct. 23, 1979  
DEPTH OF HOLE: 276  
ALTITUDE: 2,682

CASING: 0-150 blank  
150-170 slotted  
170-190 blank  
190-210 slotted  
210-230 blank  
AQUIFER: Arikaree  
DEPTH TO WATER: 23.40 Dec. 12, 1979  
23.45 Dec. 13, 1979  
23.30 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Clay, silt, siltstone, and fine-grained sand, brown, moderately well-sorted.	19	19
Clay, silt, siltstone, sandstone, and fine-grained sand, brown, not well cemented.	45	64
Clay and silt, light brown; light-colored clay; reddish-brown sandstone; few pieces of red shale.	15	79
Silt, sand, siltstone, and fine-grained sandstone, light brown to reddish-colored; some reddish-brown shale; some whitish siltstone; small amount of clay.	40	119
Silt, sand, siltstone, fine-grained sandstone, and clay, light brown to reddish-colored; some reddish-brown shale; some whitish siltstone.	37	156

WELL NUMBER: 40N37W30DDDD--Continued  
(WA 79-1)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Sand, fine-grained, and sandstone, light-colored, fairly well-sorted; some silt.	21	177
Clay and silt, light tan; some reddish-brown shale; some white clay; some siltstone and fine-grained sandstone.	20	197
Siltstone and sandstone, moderately well-sorted; some fine-grained sand, light-colored clay, and red-brown shale.	20	217
Clay, silt, fine-grained sand, and mudstone, light brown; white clay; brown siltstone.	20	237
Clay, silt, and siltstone, light brown near top with some green clay and claystone; changes below to buff-colored clay; some green clay and claystone.	20	257
Clay, light brown at top of joint; changes below to green and pink clay; few small pieces of siltstone.	19	276

COUNTY: Washabaugh  
WELL NUMBER: 41N37W24DDDD  
(WA 80-2)  
SITE NUMBER: 433020101394201  
DATE COMPLETED: Sept. 15, 1980  
DEPTH OF HOLE: 340  
ALTITUDE: 2,855

CASING: 0-260 blank  
260-300 slotted  
300-305 sandpoint  
AQUIFER: Arikaree  
DEPTH TO WATER: 72.80 Oct. 28, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and siltstone, brown; some gray siltstone.	20	20
Silt and siltstone, brown; brown clay; some gray siltstone.	40	60
Siltstone, brown; some brown clay.	20	80
Siltstone, light brown; some gray siltstone; few pieces of red sandstone.	20	100
Siltstone, light brown; some gray siltstone and red sand grains.	20	120
Siltstone, light brown; some red sand.	20	140
Siltstone, light brown to buff-colored; some red sand grains.	20	160
Siltstone, brown; some gray siltstone, brown clay, and red sand.	20	180
Siltstone, light brown; some red sand and white, sticky clay.	20	200
Siltstone and clay, light brown; some red sand grains and white, sticky clay.	20	220

WELL NUMBER: 41N37W24DDDD--Continued  
(WA 80-2)

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Siltstone, light brown and gray; some brown clay.	20	240
Siltstone, light brown and gray; some brown and white clay.	20	260
Siltstone, light brown, gray, and buff-colored; some brown and white clay.	40	300
Siltstone, brown; some gray siltstone and clay.	20	320
Siltstone and shale, gray; gray and white clay; some brown siltstone.	20	340

COUNTY: Washabaugh  
WELL NUMBER: 41N39W19ACAA  
(WA 79-2)  
SITE NUMBER: 433100102002101  
DATE COMPLETED: Oct. 24, 1979  
DEPTH OF HOLE: 278  
ALTITUDE: 2,930

CASING: 0-170 blank  
170-190 slotted  
190-210 blank  
AQUIFER: Arikaree  
DEPTH TO WATER: 145.15 Dec. 11, 1979  
143.40 Apr. 21, 1980

<u>Sample description</u>	<u>Thickness (feet)</u>	<u>Depth (feet)</u>
Silt and clay, light brown, fairly well-sorted; some siltstone.	36	36
Silt and siltstone, light brown, fairly well-sorted; some clay; increasing amount of clay near bottom of joint.	16	52
Clay, light brown; some silt, siltstone, and white clay.	29	81
Clay, light brown, with interbedded silt and siltstone.	20	101
Silt, clay, and siltstone layers, alternating, fairly well-sorted; some white clay.	39	140
Siltstone, silt, and clay layers, fairly well-sorted; some white clay.	39	179
Silt, siltstone, and clay, light brown; some reddish-brown mudstone.	20	199
Clay and silt, light brown; some siltstone; some white clay.	20	219
Clay, light brown; some light brown silt, white clay, and reddish-brown shale.	19	238
Silt and clay, light brown; some white clay; few pieces of fine-grained sandstone.	20	258
Clay and silt, light brown, changing to gray-green clay and silt; some white clay, mudstone, and brown siltstone.	20	278