STATE OF SOUTH DAKOTA
Archie Gubbrud, Governor

STATE GEOLOGICAL SURVEY
Allen F. Agnew, State Geologist

SPECIAL REPORT 14

WATER SUPPLY FOR THE CITY OF FAULKTON

by
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INTRODUCTION

Present Investigation

This report contains the results of a special investigation by the South Dakota State Geological Survey during the summer of 1961 in and around the city of Faulkton, Faulk County, South Dakota (fig. 1), for the purpose of assisting the city in locating future water supplies. Faulkton now receives its water from two wells which in recent years have not produced the quantity of water needed by the city. The two wells obtain water from the Dakota Sandstone at a depth of about 1275 feet, and are located within the city limits (fig. 2).

A survey of the ground water possibilities was made of a 36 square mile area around the city, and consisted of geologic mapping, the making of a well inventory, the drilling of 27 test holes, and the taking of 4 water samples for analysis.

The field work and preparation of this report were performed under the supervision of Merlin J. Tipton, geologist in charge of ground water studies for the State Geological Survey. The aid of Robert Schoon, geologist-driller, with the assistance of James McMeen, who drilled test holes 200-300 feet deep with the Survey's Bucyrus-Erie 10-R rotary rig, is gratefully acknowledged. Steve Pottratz and Mike Clancy drilled shallow holes with a Geological Survey jeep-mounted auger drill. Lynn Hedges gave helpful advice at several stages of the project.

The cooperation of the residents of Faulkton, especially Mayor Hamlin Turner and Water Commissioner George Fillbach is greatly appreciated. Special thanks are due to drillers John and Carroll Selnes for making their well records available. The writer also wishes to thank the State Chemical Laboratory in Vermillion for reconditioning the water analyzing equipment used in this survey and for furnishing a portable pH meter, and the U. S. Geological Survey for furnishing a specific conductance meter.

Location and Extent of Area

The city of Faulkton is located in Faulk County in east-central South Dakota, and has a population of 1,051 (1960 census). The area is in the James Basin of the Central Lowlands physiographic province (fig. 1).

Climate

The climate is continental temperate with large daily fluctuations in temperature. The average daily temperature is 44.9°F., and the average annual precipitation is 17.27 inches, at the U. S. Weather Bureau Station in Faulkton.

Figure I. Major Physiographic Divisions of South Dakota.

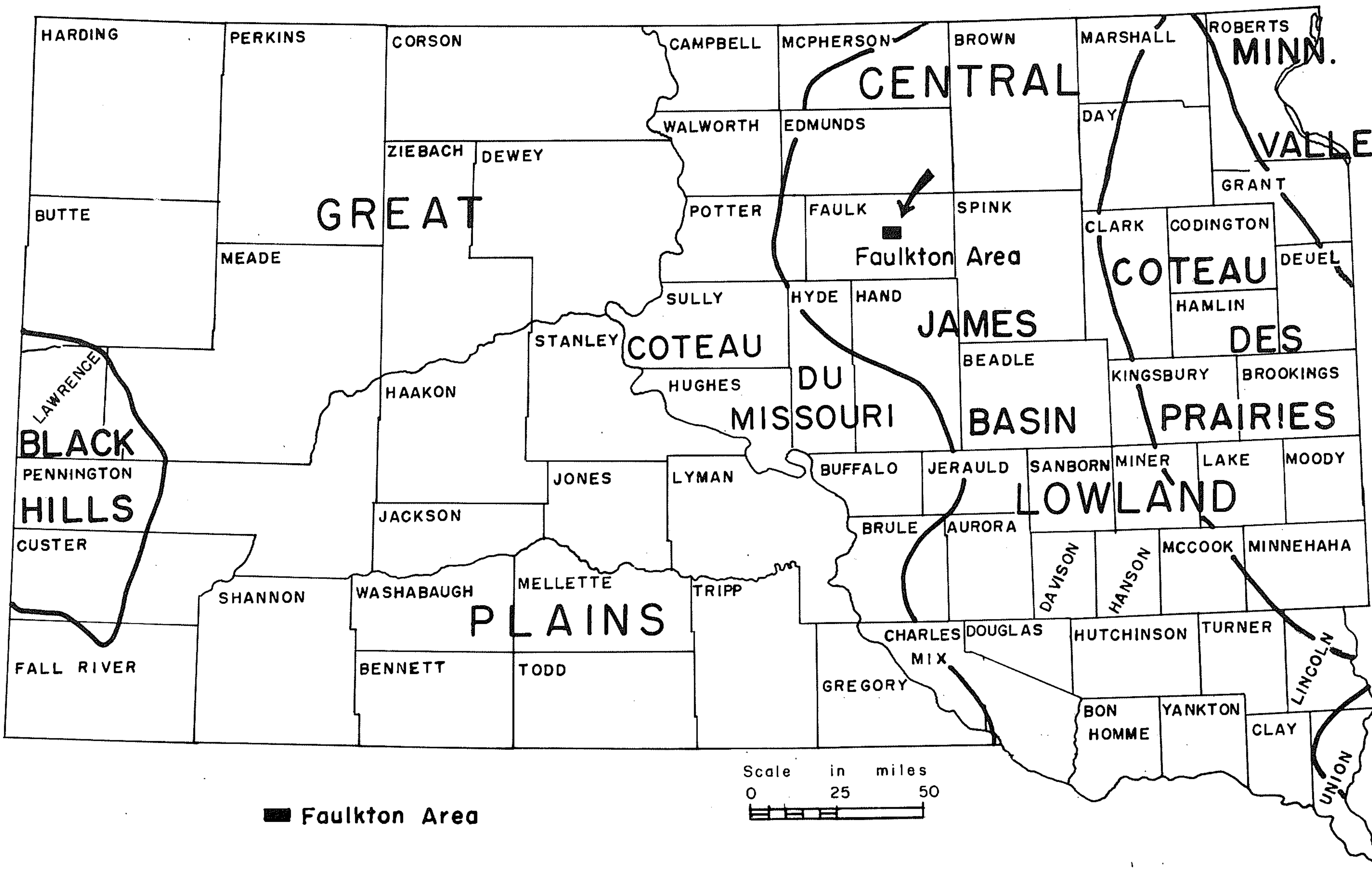
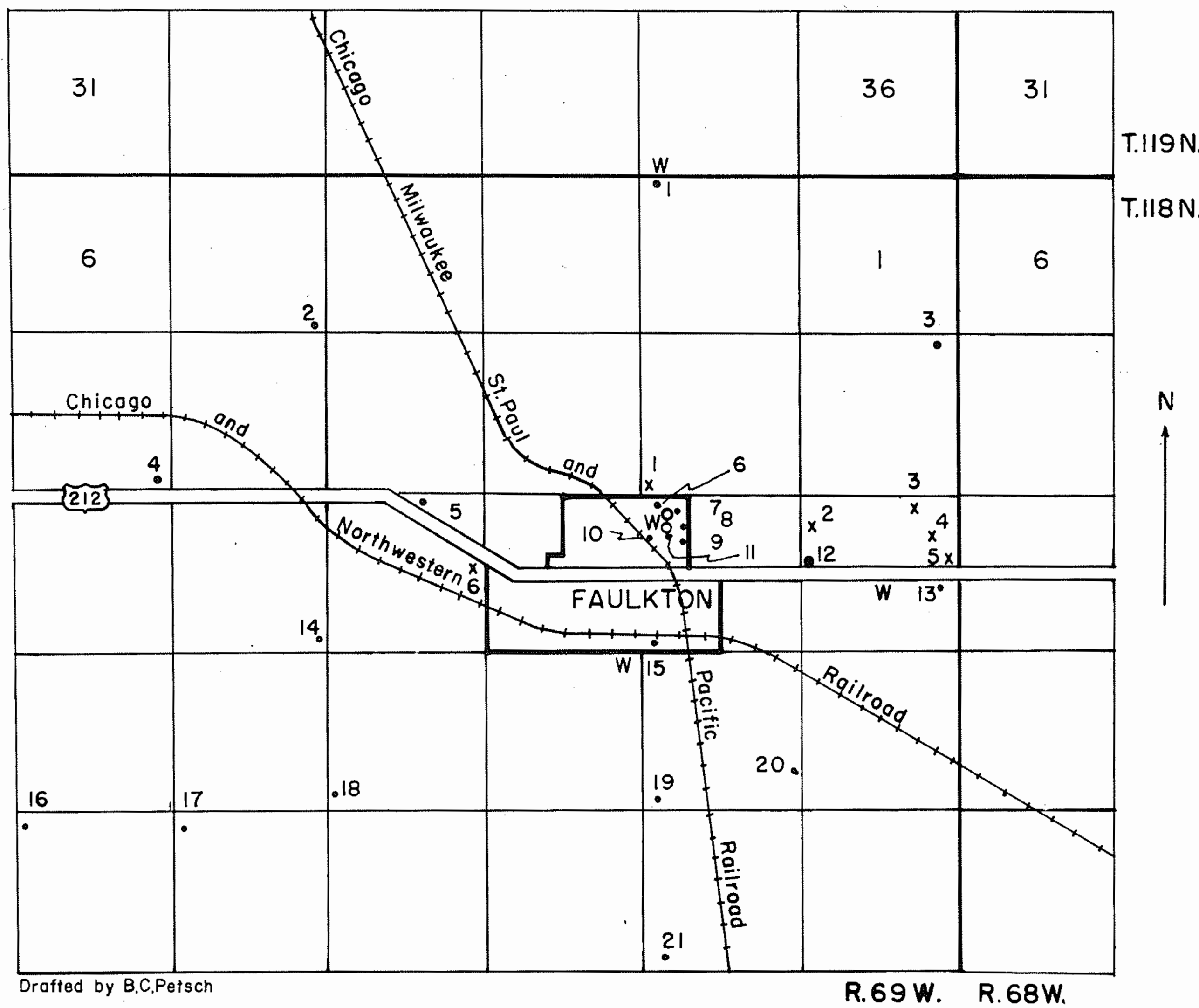


Figure 2. Data Map of Faulkton Area.



Drafted by B.C.Petsch

x Auger test hole
• Rotary test hole
O City well
W Water sample

Scale
0 ½ 1 2 3 miles

by
C.M. Christensen

Topography and Drainage

The topography of the Faulkton area is typical hummocky glacial moraine with numerous knobs and kettles. The drainage in this area is controlled primarily by the eastern flank of the Coteau du Missouri (fig. 1), and consequently the main drainage is in an easterly direction. All streams in the area are intermittent and, with the exception of Snake Creek, have narrow V-shaped valleys. Snake Creek, however, follows a more meandering path and has a broader, flat-bottomed valley (fig. 3).

GENERAL GEOLOGY

Surficial Deposits

The surficial deposits of the Faulkton area are chiefly the result of glaciation late in the Pleistocene Epoch. The glacial deposits, collectively termed drift, can be divided into till and outwash. Till consists of a jumbled mixture of clay, silt, sand, pebbles and boulders, carried and deposited by the ice itself. The outwash material, which consists primarily of sands and gravels, was deposited by meltwater streams from the wasting glaciers. Surface outwash deposits, with the exception of two small terraces along Snake Creek (fig. 3) are lacking in the mapped area.

Alluvial material has been deposited along much of Snake Creek (fig. 3) since the retreat of the glaciers. The alluvium consists of clay and silt with minor amounts of fine to medium sand.

Subsurface Bedrock

Stratified rocks of Cretaceous and Jurassic age lie beneath the surface deposits in the Faulkton area. The Pierre Shale lies directly beneath the glacial drift and is underlain in descending order by the Niobrara, Carlile, Greenhorn, and Graneros Formations, and the Dakota Group of Cretaceous age and Sundance Sandstone of Jurassic age.

The Pierre consists of light-gray fissile shale with bands of iron concretions.

The Niobrara Formation consists of light- to medium-blue-gray shale which contains numerous microscopic white calcareous specks.

The Carlile Formation is medium- to dark-gray bentonitic shale with pyrite concretions and layers of fine brown siltstone.

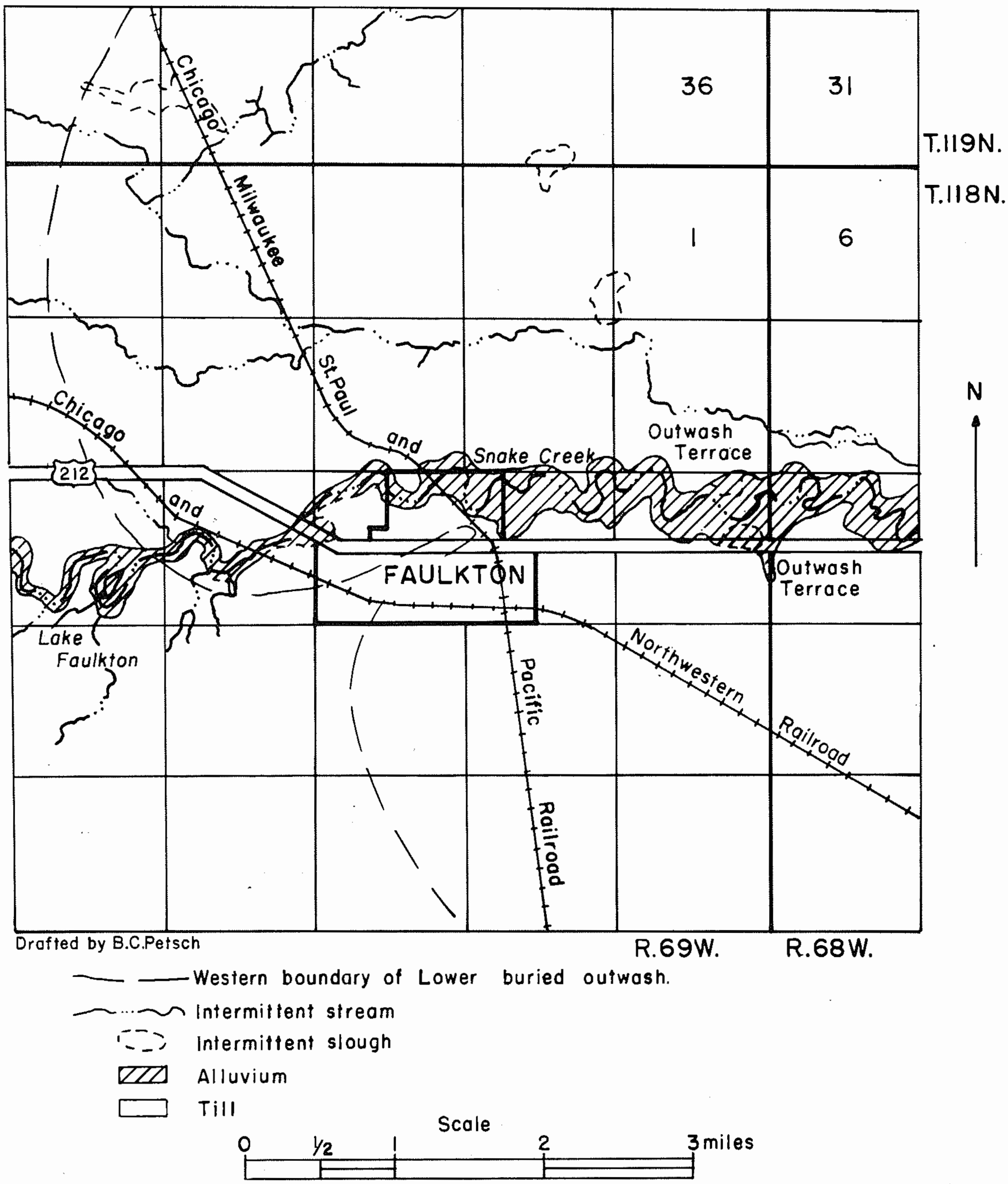
The Greenhorn Formation consists of a hard layer of white to cream limestone containing numerous fossil fragments. This limestone is overlain (and possibly underlain) by a layer of dark-gray shale containing numerous small white calcareous specks.

The Graneros Formation is hard light- to dark-gray siliceous shale.

None of the above formations will yield water readily in this area.

The Dakota Group and Sundance Sandstone contain layers of alternating sandstones and shales. The sandstones supply water to numerous wells

Figure 3. Generalized Geologic Map of Faulkton Area.



by
C.M. Christensen

in the Faulkton area (see Appendix C). These sandstones are 1100-1700 feet beneath the surface in this area; their waters are under artesian pressure, which causes some of the wells to flow.

OCCURRENCE OF GROUND WATER

Principles of Occurrence

Contrary to popular belief, ground water does not occur in "veins" that criss-cross the land at random. Instead, it can be shown that water occurs nearly everywhere beneath the surface, but at varying depths. The top of this zone of saturation is known as the water table.

Nearly all ground water is derived from precipitation. Rain or melting snow either percolates downward to the water table and becomes ground water, or drains off as surface water. Surface water may percolate downward and become ground water, or it may evaporate or drain to the sea by means of streams. In general, ground water moves laterally down the hydraulic gradient, and is in transient storage.

Recharge is the addition of water to an aquifer (water-bearing material) and is accomplished in a number of ways: (1) by downward percolation of precipitation from the land surface, (2) by downward percolation from surface bodies of water such as lakes and streams, and (3) by lateral movement of water in transient storage.

Discharge of ground water from a water-bearing material is accomplished in four main ways: (1) by evaporation and transpiration of plants, (2) by seepage upward or laterally into surface bodies of water, (3) by lateral movement of water in transient storage, and (4) by pumping.

The amount of water which can be stored in a saturated material is equal to the amount of voids or pore spaces in that material. A measurement of the capability of a material to store water (or any other liquid) is called porosity. Porosity depends entirely on the shape and arrangement of the particles in a material, and is not affected by size. Sands and gravels usually have porosities of 20-40 percent, whereas sandstones normally have porosities of 15-25 percent; this lower porosity of sandstones is due to closer packing and the cementation of the particles.

Permeability is the rate at which a fluid will pass through a substance. If the pore spaces of a material are connected, the permeability of that material will be high. If the pore spaces are not connected, the permeability will be low. Thus, a material may have high porosity and still not yield water readily because of low permeability. Sands and gravels, however, tend to have both high porosity and high permeability. Thus the geologist is not concerned with finding a "vein" when looking for a good water supply; but because water occurs almost everywhere in the ground, he is searching instead for a sand or gravel deposit that lies beneath the water table.

Ground Water in Alluvium

Alluvium is present along Snake Creek in the Faulkton area (fig. 3). This alluvium contains large amounts of water where it is below the water table, but because of its low permeability it does not yield water readily. The alluvium along Snake Creek was test-drilled with the State Geological Survey's jeep-mounted auger drill (see Appendix B) but the sediments were too fine and the deposit too thin to provide an adequate amount of water for the city.

Ground Water in Glacial Deposits

As was stated earlier, glacial deposits can be divided into till and outwash. Till, because of its unsorted nature and the larger amount of clay, usually does not yield water readily. Outwash, on the other hand, is a good source of ground water because of its high porosity and permeability.

The outwash deposits of the Faulkton area include the outwash terraces along Snake Creek mentioned earlier, two relatively small upper buried outwashes, and a more extensive lower buried outwash.

The outwash terrace deposits along Snake Creek are not considered to be a potential source of water for the city because they cover a relatively small area and for the most part are above the water table.

One of the upper buried outwashes underlies the town of Faulkton (Test Hole 8, Appendix A) and the other occurs about 3 miles southwest of Faulkton (Test Holes 16 and 17, Appendix A). Neither of these upper buried outwashes covers a very large area nor are they more than 18 feet thick where tested. These two upper buried outwashes are overlain by 30-65 feet of till.

The lower buried outwash in the area mapped covers about 30 square miles and is overlain by 100-200 feet of till. The trend of this outwash is northwest-southeast through the town of Faulkton (fig. 4). The outwash sand and gravel averages about 20 feet thick and has a maximum thickness of more than 40 feet (Test Hole 20).

The thickness and distribution of the lower buried outwash in the mapped area is shown on Figure 4; the thickest part of this outwash is about 1 mile southeast of Faulkton.

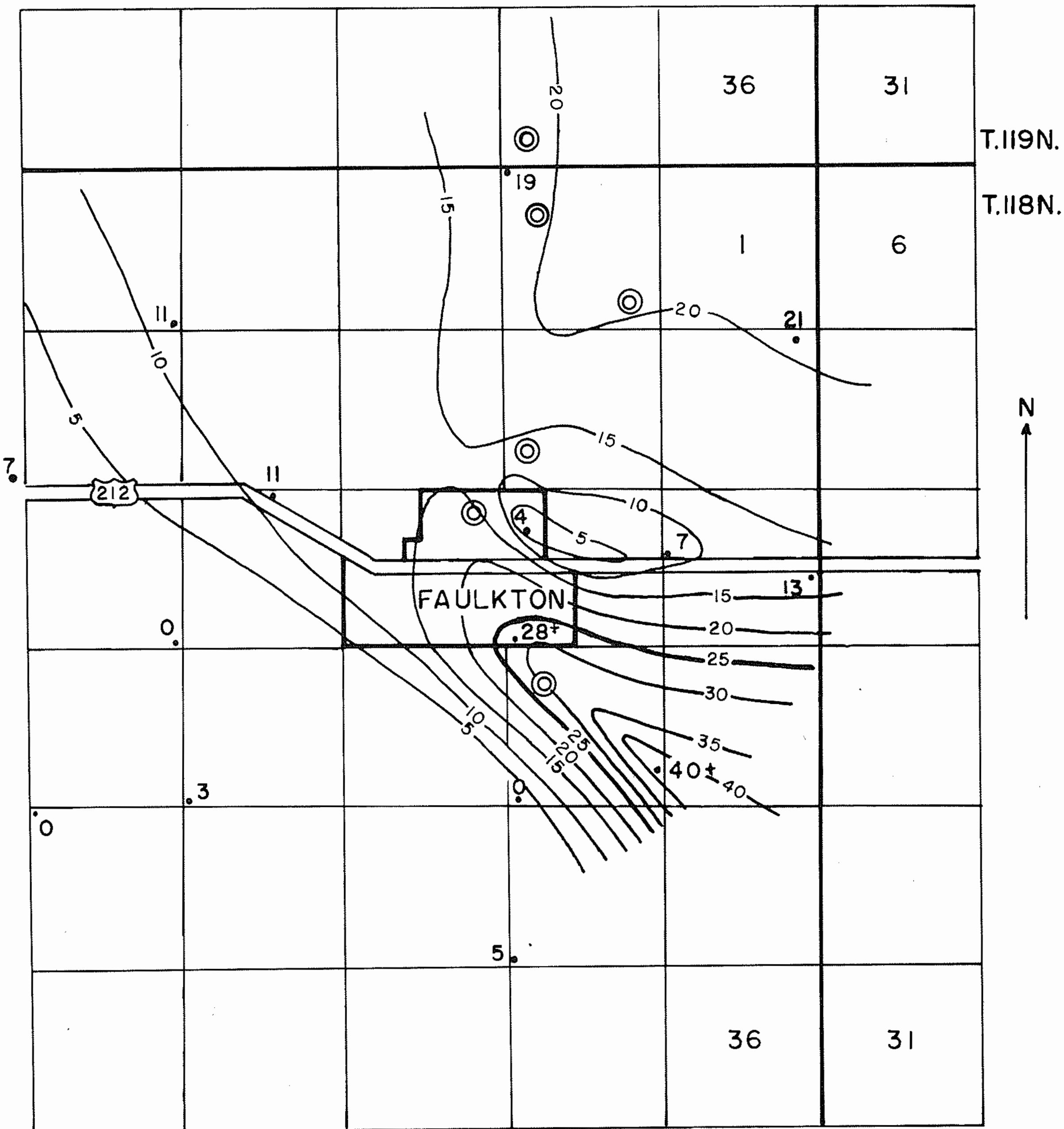
The sediments of the lower buried outwash have a channel-like appearance (fig. 5) and appear to have been deposited in a pre-glacial channel cut into the Pierre Shale.

The pre-glacial channel extends in a southeasterly direction from a broad, flat plain (fig. 5). The channel has a steep side on the west and a more sloping side on the east. It is possible that the channel was an outlet for a large body of water to the north.

Both the upper and lower buried outwashes were test-drilled with the State Geological Survey's rotary drilling rig. The test holes were drilled with natural mud, using a $4\frac{1}{2}$-inch drag bit.

The areal extent of the lower buried outwash was mapped as accurately as possible from these test holes and from a well inventory of the area. The approximate western boundary of this buried outwash is shown on Figure 4 by the five-foot contour, but the eastern boundary is somewhere east of the area mapped.

Figure 4. Isopach Map Showing Thickness of the Lower Buried Outwash Deposit in the Faulkton Area.



Drafted by B.C.Petsch

Lines of equal thickness.

• Test hole showing thickness of sand and gravel.

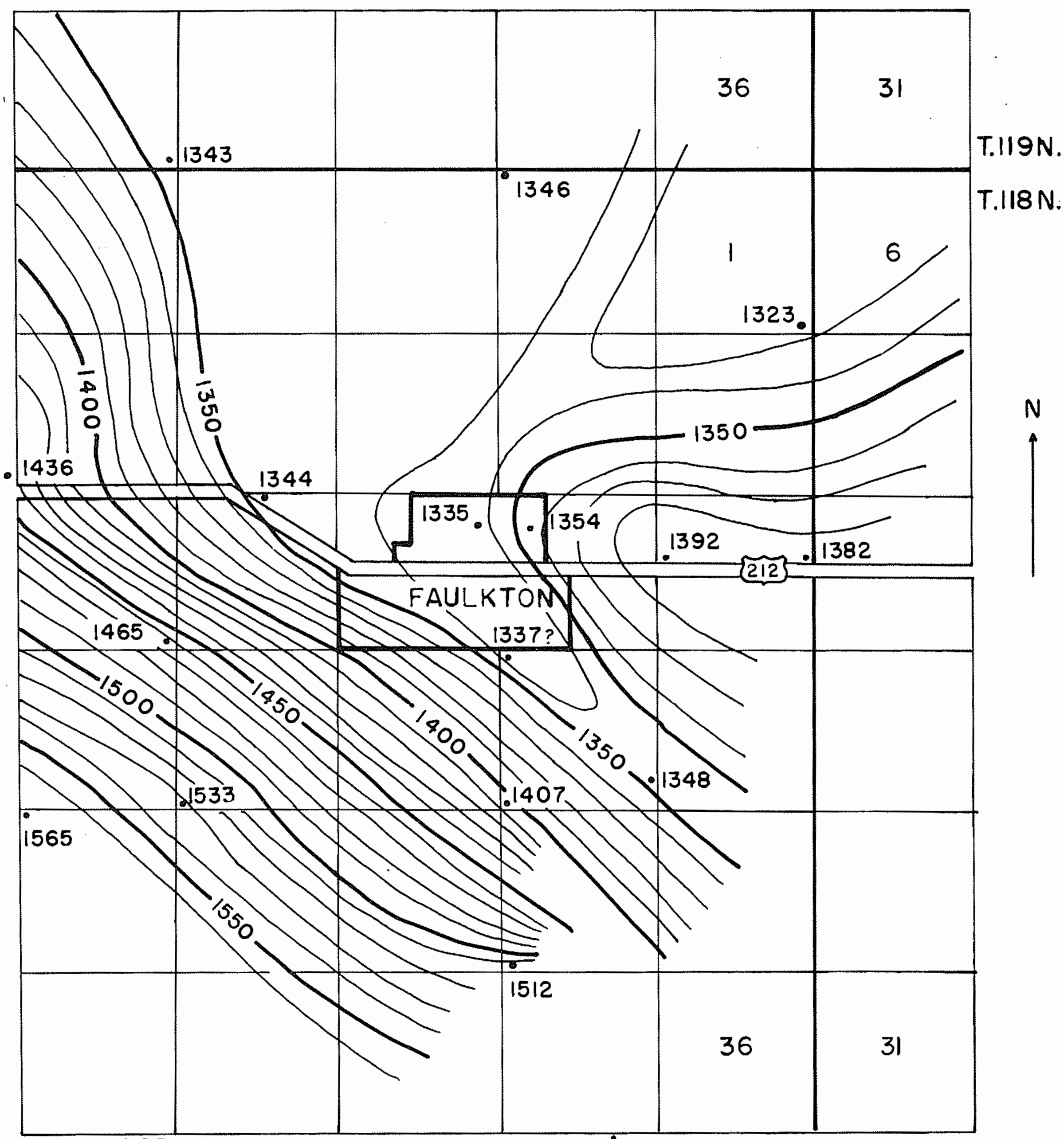
◎ Well producing from lower buried outwash; thickness not available.

Scale: 0, ½, 1, 2, 3 miles

by

C.M. Christensen

Figure 5. Map Showing Configuration of Buried Surface of Pierre Shale. in the Faulkton Area.



Drafted by B.C.Petsch

R.69W. R.68W

• Test hole showing altitude above sea-level of the Pierre Shale.

Contour line showing elevation above sea-level. (interval 10 feet)

Scale

0 ½ 1 2 3miles

by

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Ground Water in Bedrock

The sandstones of the Dakota and Sundance are the only bedrock in the Faulkton area from which water can be obtained. These sandstones are at a depth of 1100 to 1700 feet beneath the surface, and their waters are under artesian pressure. Numerous wells in the Faulkton area produce water from these sandstones (Appendix C). Some of these wells that are at lower surface elevations will flow; others have to be pumped.

The recharge for these sandstones in South Dakota is said to come from the Rocky Mountains or the Black Hills, where they crop out at a much higher elevation than in the Faulkton area. The overlying Cretaceous and Jurassic shales provide the impervious material that confines the water to the sandstones.

Quality of Ground Water

Precipitated water is nearly pure before it reaches the ground; however, all ground water contains minerals which are obtained (1) from the atmosphere, (2) from soil and underlying deposits as the water percolates downward to the water table, and (3) from deposits below the water table in which the water is circulating. In general it can be said that the more minerals a water contains, the poorer its quality. The water in the Dakota Sandstones is of a poorer quality than that in the buried outwash deposits.

Table 1 is a comparison of various waters in the Faulkton area with the present city water and with the Public Health Standards for drinking water. It can be seen that both of the present city wells (which produce from the Dakota Sandstones) exceed the Public Health Standards for drinking water in the amounts of chloride, fluoride, and total solids. City Well No. 2 is also higher than the standards for iron, and City Well No. 1 is higher than the Public Health Standards for sulfate. The samples taken from the lower buried outwash (samples D, E, F, G) have better quality water than the city wells, although they show a slightly harder water. In all samples the shallow water contains a lesser amount of chloride.

CONCLUSIONS AND RECOMMENDATIONS

It is recommended that the city of Faulkton test for future water supplies between Test Hole 15 (SW$\frac{1}{4}$ sec. 14, T. 118 N., R. 69 W.) and Test Hole 20 (SE$\frac{1}{4}$ sec. 23, T. 118 N., R. 69 W.). Thicker gravel was penetrated in these two test holes than in any of the other test holes drilled by the South Dakota State Geological Survey. It would be advisable for the city to drill several more test holes between Test Holes 15 and 20 in order to find the best well site. After a well site is chosen, a test well should be installed and test-pumped. This test-pumping should be conducted by licensed engineers and should be run for a minimum of 72 hours.

Table 1.--Chemical Analyses of Ground Water in the Faulkton Area
(for locations see figure 2)

Sample	Parts Per Million										Hardness $CaCO_3$	Total Solids
	Calcium	Sodium	Chloride	Sulfate	Iron	Magnesium	Nitrate	Fluoride	Manganese	pH		
A	--	--	250	500*	0.3	--	10*	0.9-1.7**	0.05	--	--	1000*
B	22	699	378	541	0.2	7	0.0	2.8	0.0	8.1	84	2007
C	12	1472	1725	228	0.6	13	0.0	2.1	0.0	8.4	83	4790
D	68	400	152	466	0.4	13	Trace	0.4	0.7		223	1426
E	31	493	202	304	0.7	4	0.3	0.6	None		94	1448
F	169		330	194	0.0						300	
G	59	700	818	142	1	10	1.1	0.2	Trace		190	2122

A. Drinking Water Standards of the U. S. Public Health Service, 1961 (not to exceed)
B. Faulkton City Well No. 1
C. Faulkton City Well No. 2
D. John Hansen, NW$\frac{1}{4}$ sec. 23, T. 118 N., R. 69 W.
E. Carroll Selnes, NW$\frac{1}{4}$ sec. 14, T. 118 N., R. 69 W.
F. Orval Niederbaumer, SW$\frac{1}{4}$ sec. 35, T. 119 N., R. 69 W.
G. B. J. Kalkman, NE$\frac{1}{4}$SW$\frac{1}{4}$ sec. 13, T. 118 N., R. 69 W.

* modified for South Dakota by the State Department of Health (written communication, February 5, 1962)
** optimum

Samples B and C were analyzed by the State Department of Health in Pierre; samples D, E, and G by the State Chemical Laboratory in Vermillion; and sample F by the State Geological Survey's field chemical kit.

It is suggested that the city contract with a commercial drilling company licensed by the State of South Dakota to test-drill the areas recommended. The city officials should consult the State Water Resources Commission with regard to obtaining a water right and a permit to drill a city well, and the State Department of Health with regard to the biological and chemical suitability of the water. A consulting engineering firm licensed in the State of South Dakota should be hired to design the well and adjoining water system.

REFERENCES CITED

U. S. Public Health Service, 1961, Drinking water standards: Am. Water Works Assoc. Jour., v. 53, no. 8, p. 935-945.

APPENDIX A

Logs of Rotary Test Holes in the Faulkton Area

(for location see figure 2)

Test Hole No. 1
Surface elevation: 1575 feet

0- 35	clay, buff, sandy
35- 67	clay, gray, sandy
67- 76	sand, coarse, black
76-130	clay, gray, sandy
130-134	gravel, pea size
134-150	clay, gray, sandy with thin gravelly streaks
150-154	gravel, pea size to $\frac{1}{2}$-inch, may be caving from 130-134
154-166	clay, gray, sandy and gravelly
166-168	gravel, pea size
168-210	clay, gray, fine, sandy
210-229	gravel, pea size and coarse sand
229-240	Pierre Shale

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Test Hole No. 2
Surface elevation: 1628 feet

0- 51	clay, buff, sandy and pebbly
51-150	clay, gray, sandy, few pebbles
150-165	clay, gray, fine, sandy
165-274	clay, gray, very pebbly
274-285	gravel, fine to pea size
285-300	Pierre Shale

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Test Hole No. 3
Surface elevation: 1530 feet

0- 15	clay, buff, very sandy
15- 47	clay, gray, very sandy
47- 53	sand, coarse, black, much coal
53- 93	clay, gray, very sandy
93-105	gravel, pea size
105-110	clay, gray, sandy
110-125	gravel, pea size
125-172	clay, gray, sandy with gravelly streaks
172-184	gravel, pea to nut size
184-186	clay, gray, sandy

(continued on next page)

Test Hole No. 3--continued

186-207	gravel, pea size and coarse sand
207-220	Pierre Shale

* * * * * *

Test Hole No. 4
Surface elevation: 1650 feet

0- 27	clay, buff, sandy
27-130	clay, gray, sandy
130-140	interbedded clay and fine gravels
140-149	clay, gray, sandy
149-156	sand, coarse, black (coal fragments)
156-190	clay, gray, very sandy
190-197	gravel, pea size (clayey?)
197-214	clay, gray, sandy
214-240	Pierre Shale

* * * * * *

Test Hole No. 5
Surface elevation: 1610 feet

0- 27	clay, buff, sandy
27- 91	clay, gray, sandy
91- 93	gravel, pea size
93-148	clay, gray, sandy
148-155	sand, very coarse and gravel,pea size
155-250	clay, gray, sandy
250-255	sand, coarse
255-266	gravel, pea size
266-280	Pierre Shale

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Test Hole No. 6
Surface elevation: not measured

0-100	losing all our drilling fluid - no cuttings

* * * * * *

Test Hole No. 7
Surface elevation: 1575 feet

0- 27	clay, buff, sandy, very pebbly
27- 28	gravel, fine to coarse
28- 33	clay, buff, sandy
33- 65	clay, gray, sandy
65- 78	sand, coarse and gravel,pea size

(continued on next page)

Test Hole No. 7--continued

78-115	clay, gray, sandy, pebbly
115-128	sand, coarse, many coal fragments
128-175	clay, sandy, gray
175-180	sand, coarse, 95 percent coal fragments
180-214	clay, gray, sandy; struck boulder - could not penetrate - moved rig

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Test Hole No. 8
Surface elevation: 1575 feet

0- 27	clay, buff, sandy, pebbly
27- 28	gravel, coarse to fine
28- 33	clay, buff, sandy
33- 65	clay, gray, sandy
65- 78	sand, coarse and pea size gravel
78-115	clay, gray, sandy, pebbly
115-128	sand, coarse, many coal fragments
128-175	clay, gray, sandy
175-180	sand, coarse, 95 percent coal fragments
180-216	clay, gray, sandy; struck boulder - could not penetrate - moved rig

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Test Hole No. 9
Surface elevation: 1575 feet

0-27	clay, buff, sandy, pebbly
27-28	gravel, coarse to fine
28-33	clay, buff, sandy; struck boulder - could not penetrate - moved rig

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Test Hole No. 10
Surface elevation: not measured

0-80	losing all our drilling fluid - no cuttings

* * * * * *

Test Hole No. 11
Surface elevation: 1574 feet

0- 29	clay, buff, sandy
29- 64	clay, gray, sandy
64- 83	gravel, pea size
83- 87	clay, gray, silty, sandy

(continued on next page)

Test Hole No. 11--continued

87- 93	gravel, pea size
93- 97	silt?, alluvium?
97-105	gravel, pea to nut size
105-215	clay, gray, sandy
215-219	gravel, nut size
219-220	boulder, 1 foot in diameter
220-240	Pierre Shale

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Test Hole No. 12
Surface elevation: 1564 feet

0- 33	clay, buff, sandy
33-110	clay, gray, sandy, few cobbles
110-115	sand, coarse, black, much coal, some pea gravel
115-130	clay, gray, sandy
130-137	sand, coarse and fine gravel - may be interbedded with clay
137-144	clay, gray, sandy
144-149	gravel, pea size
149-160	gravel, coarse, may be interbedded with clay
160-165	clay, gray, pebbly
165-172	gravel, pea size
172-180	Pierre Shale

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Test Hole No. 13
Surface elevation: 1545 feet

0- 35	clay, buff, sandy
35- 54	clay, gray, sandy
54- 58	gravel, fine to coarse
58- 70	clay, gray, sandy
70- 75	sand, coarse, and pea size gravel, many coal fragments
75-123	clay, gray, sandy
123-134	sand, gray, coarse, some pea size gravel
134-150	clay, gray, sandy, interbedded with thin gravels
150-163	gravel, pea to nut size
163-170	Pierre Shale

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Test Hole No. 14
Surface elevation: 1640 feet

0- 42	clay, buff, sandy and pebbly
42-108	clay, gray, sandy
108-115	sand, coarse and gravel, pea size
115-128	clay, gray, sandy

(continued on next page)

Test Hole No. 14--continued

128-133	sand, coarse and pea size gravel
133-175	clay, gray, sandy
175-180	Pierre Shale

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Test Hole No. 15
Surface elevation: 1590 feet

0- 37	clay, buff, sandy
37- 63	clay, gray, sandy
63- 65	sand, coarse
65- 87	clay, gray, sandy
87- 90	sand, coarse
90-132	clay, gray, sandy
132-140	gravel, coarse(3/4 to 1 inch)
140-225	clay, gray, sandy and pebbly
225-253	gravel, $\frac{1}{4}$ to 1 inch, lost circulation twice, abandoned hole - very possible we struck bedrock clay or shale at 252-53 but could get no cuttings to verify this

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Test Hole No. 16
Surface elevation: 1707 feet

0- 30	clay, buff, sandy
30- 45	sand, coarse
45-150	clay, gray, very sandy
150-160	Pierre Shale

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Test Hole No. 17
Surface elevation: 1688 feet

0-27	clay, buff, sandy
27-52	clay, gray, sandy
52-70	gravel, pea to nut size
70-80	clay, gray, sandy?, drilled like clay but lost mud and plugged bit - abandoned hole

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Test Hole No. 18
Surface elevation: 1664 feet

0- 21	clay, buff, sandy
21-128	clay, gray, sandy
128-131	sand, coarse, black
131-140	Pierre Shale

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Test Hole No. 19
Surface elevation: 1580 feet

0- 35	clay, buff, few sandy streaks
35- 46	clay, gray, sandy
46- 48	gravel, pea size, sand, coarse, iron-stained
48-108	clay, gray, sandy
108-113	sand, coarse and pea size gravel
113-132	clay, gray, sandy
132-136	sand?,composed of rounded Pierre Shale fragments
136-170	clay, gray, sandy
170-173	sand, coarse, black
173-180	Pierre Shale

* * * * * *

Test Hole No. 20
Surface elevation: 1588 feet

0- 18	clay, buff, sandy
18- 44	clay, gray, sandy
44- 51	sand, coarse
51- 95	clay, gray, very sandy
95- 97	sand, coarse
97-110	clay, gray, sandy
110-113	sand, coarse and gravel, fine
113-127	clay, gray, sandy
127-133	gravel, fine to pea size
133-175	clay, gray, sandy
175-177	gravel, nut size
177-196	clay, gray, sandy
196-210	sand, fine to coarse, stringer of pea gravel at 203
210-218	gravel, nut size
218-240	gravel, pea to nut size, losing mud, binding bit, abandoned hole

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Test Hole No. 21
Surface elevation: 1612 feet

0- 25	clay, buff, sandy
25- 95	clay, gray, sandy and pebbly
95-100	sand, coarse and gravel, pea size
100-120	Pierre Shale

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APPENDIX B

Logs of Auger Test Holes in the Faulkton Area

(for location see figure 2)

Test Hole No. 1
Surface elevation: not measured
Depth to water: 18 feet

0- 4	sand, fine
4- 9	clay, dark
9-14	clay, gray, sandy
14-19	gravel
19-49	clay, blue, saturated

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Test Hole No. 2
Surface elevation: not measured
Depth to water: 20 feet

0- 4	sand, fine
4- 9	clay, dark brown, sandy
9-14	clay, brown and sand, coarse
14-39	clay, brown and sand, fine
39-49	clay, gray, and sand fine
49-64	clay, blue

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Test Hole No. 3
Surface elevation: not measured
Depth to water: 12 feet

0- 4	topsoil
4- 9	clay, brown, sandy
9-24	sand, coarse and clay, gray
24-29	clay, blue

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Test Hole No. 4
Surface elevation: not measured
Depth to water: 9 feet

0- 4	topsoil, sandy and fine sand
4-24	sand, fine to coarse and some brown clay
24-34	sand, fine to coarse, dark, and some clay
34-39	sand, very fine and clay
39-44	sand, very fine and clay, blue, saturated

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Test Hole No. 5
Surface elevation: not measured
Depth to water: 8 feet

0- 4	topsoil, fine, silty
4-29	clay, blue, some sand

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Test Hole No. 6
Surface elevation: not measured
Depth to water: 52 feet

0- 4	topsoil, some sand
4- 9	clay, brown, sandy
9-14	clay, brown, some sand
14-19	clay, brown
19-64	clay, blue, some pebbles

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APPENDIX C

Table 2.--Records of Wells

Well location: Letters stand for quarter section, first number for section, second for township north, third for range west
Type of well: Du, dug; D, drilled; B, bored
Water-bearing material: o, outwash; ss, sandstone; sl, sand lense; sh, shale
Use of water: S, stock; D, domestic

Well Location	Owner or Tenant	Type of Well	Depth of Well (feet)	Geologic Source	Water-Bearing Material	Use of Water
SW-4-117-68	D. Martschinske	D	1169	Dakota	ss	S, D
SW-6-117-68	J. Muehl	D	1173	Dakota	ss	S, D
SW-117-69	E. Gebhart	D	1234	Dakota	ss	S, D
NW-2-117-69	L. Bowar	D	1252	Dakota	ss	S, D
NE-3-117-69	H. Bowar	D	1230	Dakota	ss	S, D
SW-4-117-69		D	1200±	Dakota	ss	S, D
NW-5-117-69	E. Martschinske	D	1100-1300	Dakota	ss	S, D
SE-6-117-69		D	1100-1300	Dakota	ss	S, D
NE-7-117-69	R. Potter	D	1200?	Dakota	ss	S, D
NE-10-117-69	H. Bowar	D	1240?	Dakota	ss	S, D
NW-4-118-68		D	1100-1300	Dakota	ss	S, D
SE-9-118-68		B	150±	Glacial	o	
NW-19-118-68		D	1100-1300	Dakota	ss	S, D
SE-2-118-69	Wahlene		200	Glacial	o	
NW-2-118-69	D. Dieter		210	Glacial	o	S, D
SE-3-118-69	ABANDONED			Glacial?	o	
SW-11-118-69	W. Thelen	D	192	Glacial	o	S, D
NW-13-118-69	B. Kalkman	B	70	Glacial	sl	S

Appendix C - Records of Wells--continued

Well Location	Owner or Tenant	Type of Well	Depth of Well (feet)	Geologic Source	Water-Bearing Material	Use of Water
NW-13-118-69	B. Kalkman	D	157	Glacial	sl	D
NW-14-118-69	Faulkton (city)	D	1283	Dakota	ss	D
NE-15-118-69	C. Selnes	D	237*	Glacial	o	D
NE-15-118-69	J. Selnes	D	240?	Glacial	o	D
NE-17-118-69	K. Dieter	D	1301	Dakota	ss	S, D
SW-18-118-69	Henderson	Du		Glacial?		S, D
SE-18-118-69	E. Thelen	D	197	Glacial	sl	S, D
SE-20-118-69	D. Biedenfeld	D	1400?	Dakota	ss	S, D
SE-21-118-69	J. Mauk	D	1400?	Dakota	ss	S, D
SE-22-118-69	F. Thompson	D	1100-1300	Dakota	ss	S, D
NW-23-118-69	J. Hansen	D	235	Glacial	o	D
SW-23-118-69	E. Hillman	D	1400?	Dakota	ss	
NW-23-118-69	A. Hillman	Du	80?	Glacial	o	D
NE-27-118-69		D	1400?	Dakota	ss	S, D
NE-28-118-69	C. Bowar	D	1400±	Dakota	ss	S, D
NE-30-118-69	O. Kleeblatt	B	135?	Glacial	sl	S, D
NW-31-118-69	A. Kleeblatt	D	1324	Dakota	ss	S, D
NE-34-118-69	W. Martschinske	D	1400?	Dakota	ss	S, D
SW-12-118-70	K. Hagman	B	160	Glacial	sl	
SW-13-118-70	A. Wescott	D	148	Glacial	o	D
NW-14-118-70	J. Selnes	D	1728	Sundance?	ss	

Appendix C - Records of Wells--continued

Well Location	Owner or Tenant	Type of Well	Depth of Well (feet)	Geologic Source	Water-Bearing Material	Use of Water
NE-23-118-70	B. Hutch	Du	90±	Glacial	sl	
NE-24-118-70	Moss	Du		Glacial?		
SW-35-118-70	B. Marsh	D	1500±	Dakota?	ss	S, D
SE-16-119-68		D	1170±	Dakota	ss	S, D
NW-19-119-68		D	1100-1300	Dakota	ss	S, D
SW-21-119-68		D	1200±	Dakota	ss	S, D
SE-28-119-68	ABANDONED	D	1500-1700		ss	S
SW-29-119-68		D	200±	Glacial	o	S, D
SE-29-119-68		D	1100-1300	Dakota	ss	S, D
SE-33-119-68		D	1500±		ss	S, D
SW-34-119-68	M. Melus	D	1100-1300	Dakota	ss	S, D
NE-21-119-69	Kleefman	D	1595		ss	S, D
NW-28-119-49		D	1100-1300	Dakota	ss	S, D
SE-30-119-69		Du		Glacial?		S, D
SE-34-119-69	O. Niederbaumer	D	1200?	Dakota	ss	S, D
SW-35-119-69	O. Niederbaumer	D	220	Glacial	o	S
SE-36-119-69	D. Morrow	Du	55	Glacial	sl	S, D
SE-25-119-70		D	1364±	Dakota	ss	
SE-26-119-70	A. Wyant	D	328	Pierre?	sh	

* top of Pierre Shale