STATE OF SOUTH DAKOTA
Richard Kneip, Governor

DEPARTMENT OF NATURAL RESOURCE DEVELOPMENT
Vern W. Butler, Secretary

GEOLOGICAL SURVEY
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GROUND-WATER STUDY FOR THE HANSON RURAL WATER SYSTEM

by

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Vermillion, South Dakota
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GROUND-WATER STUDY FOR THE HANSON RURAL WATER SYSTEM

At the request of the Hanson Rural Water System, the South Dakota Geological Survey conducted a ground-water study in the area east and south of Bridgewater, South Dakota. The purpose of the study was to locate a source of ground-water for the Rural Water System. Five weeks of drilling along with making well inventories and collection and analysis of water samples from Hanson, McCook, Davison, Hutchinson, and Miner Counties were done in 1977. In addition, three observation wells were installed. A 4-inch diameter observation well was constructed and pumped by air and measured to obtain the rate of flow and a water sample was collected and analyzed (table 1, sample W51) for water quality.

The cooperation of the residents in the five-county area was greatly appreciated.

This study was financed by the South Dakota Geological Survey, the Hanson Rural Water System, and the Lower James Conservancy Sub-District.

Figure 1 shows the locations of the 52 water samples collected during the study. Table 1 provides the results of chemical analysis of the water samples collected.

As a result of the low levels of total solids, nitrate, and the well inventory, an area east and south of Bridgewater was selected for a detailed study.

Sixty-two test holes were drilled in the Bridgewater area and the logs of these test holes can be found in appendix A. The

locations of the test holes are shown in figure 2 along with the locations of observation wells installed by the South Dakota Geological Survey.

Three sand and gravel layers were found at various depths during the study; however, only one layer was selected for a detailed study because of its greater thickness of sand and gravel and water quality. Figures 2a and 2b show, in cross-section, the depth and thickness of this aquifer. Figure 3 is a contour map of the aquifer showing the extent and thickness of the aquifer and the recommended area for further study.

The total dissolved solids in the samples in this area varies from under 800 parts per million to over 4000 parts per million (table 1). The nitrate content in seven samples exceed the limits of the National Interim Primary Drinking Water Regulations (table 1). Also, some samples exceed the limits of the Proposed National Secondary Drinking Water Regulations (2 samples exceed chloride; 43 samples exceed sulfate, 42 samples exceed iron, 31 samples exceed manganese, and all samples exceed total solids).

The only extensive aquifer with relatively low dissolved chemicals in the study area is in the recommended area (fig. 1 and table 1). Sample W17 and W51 have under 800 parts per million total dissolved solids. Sample W51 was collected from an observation well (test hole 43) constructed by the South Dakota Geological Survey. Samples W7 and W19, collected from the northern and eastern part of the recommended area have total dissolved solids of less than 1400 parts per million (fig. 1

and table 1). The water samples from the recommended area do not exceed the limits of the National Interim Primary Drinking Water Regulations. The samples do, however, exceed the recommended limits for iron and total dissolved solids. The limits for iron, manganese, sulfate, and total dissolved solids are included in the Proposed National Secondary Drinking Water Regulations. Sample W7 exceeds the recommended limit for sulfate and sample W19 exceeds the recommended limits for sulfate and manganese. In the vicinity of the recommended area some samples have higher dissolved chemical contents than do the samples from within the recommended area (samples W50 and W52).

Three observation wells (see fig. 2 for location) were installed in the area. Water levels were measured in observation wells numbers 38, 60, and 43, and the depths to water from the ground surface were 63'4", 69', and approximately 52', respectively. To determine the rate of flow an air compressor was used to pump well no. 43 for a period of 3 hours. The rate of flow was, conservatively, 70 gallons per minute.

It is recommended that the Hanson Rural Water System test for future water supplies in the recommended area (fig. 3). This recommendation is based on grain size, clay and silt content, areal extent, thickness of sand and gravel, and water quality.

Additional testing should be done by a consulting engineer, licensed in South Dakota, who would plan and coordinate any additional testing. On the basis of the engineer's recommendation a commercial well drilling company should be engaged to drill additional test holes. This would allow the location of the best

site within the recommended area for the installation of a test well. The test well would be used to determine the quality of the water, yield, drawdown, and recovery data. The results of testing will help to determine if the quantity and quality of the water is satisfactory. Also, based on the results of the pump test a safe distance between future wells can be determined. The pump test should be conducted by a hydrologist or a qualified engineer and run for a minimum of 72 hours. The South Dakota Geological Survey will provide a hydrologist to supervise the conduction of the pump test. It is also recommended that the elevation of observation well no. 60 and any other well or observation well drilled in the area be established and the water level measured to determine the ground-water gradient. This will help to predict if the water with high dissolved content to the northeast of the recommended area is likely to move to wells drilled in the recommended area.

Before a permanent well is drilled the Hanson Rural Water System should consult with the South Dakota Water Resources Commission to obtain water rights and a permit to drill a Rural Water System well and with the South Dakota Department of Environmental Protection to determine biological and chemical suitability of the water.

This report was prepared by Carl Cripe and Assad Barari in 1977.

After the completion of the field work and analysis of the data, the results were presented orally to the Board of Direc-

tors of the Hanson Rural Water System. Huron Drilling Inc. was hired to drill additional test holes and construct a pump test well. At the instruction of Bartlett and West Consulting Engineers, six test holes were drilled in section 29, Township 101 North, Range 55 West and one production well was constructed. A 72-hour pump test was conducted and recovery was measured by the consulting engineer in August, 1978. More detailed data on the well construction and pump test is presented in "Preliminary Report For A Public Water Supply and Distribution System for Hanson County Rural Water District" prepared by Bartlett and West Consulting Engineers in 1978.

The representatives of the South Dakota Geological Survey visited the pump test operation and collected a water sample for chemical analyses. The results of the water sample show that the water was comparable to or slightly better than sample W51 (table 1) collected from observation well 43. The total solids in the sample collected from the pump test well was 520 parts per million (ppm). The constituent concentrations were as follows: calcium, 27 ppm; sodium, 177 ppm; magnesium, 7 ppm; chloride, 17 ppm; sulfate 10 ppm; iron, 1.2 ppm; manganese, less than 0.05 ppm; and nitrate less than 0.5 ppm.

After reviewing the pump test data, it was concluded that the aquifer could probably yield the required water for the System (approximately 270 gal/min). However, there were some factors such as a very rapid change in the aquifer thickness over a short distance, a change in the pumping rate during the test, and the presence of flammable gas in some of the observa-

tion wells which require additional testing. Therefore the following recommendations were made:

1. Before any other construction on the system is started, additional production wells should be drilled and a pump test with a minimum duration of 72 hours should be performed on one well and shorter tests be performed on the others. The tests should be performed with a constant flow and a flow meter should be installed to monitor the flow.
2. Water samples should be collected during the test for chemical analyses.
3. Investigations should be conducted to determine what types of problems may arise due to the presence of flammable gas in the area.

REFERENCES CITED

Bartlett and West, 1978, Preliminary report for a public water supply and distribution system for Hanson County Rural Water District, Hanson County, South Dakota: Bartlett and West Consulting Engineers, Mitchell, South Dakota.

Federal Register, 1975, National Interim Primary Drinking Water Regulations, v. 40, no. 248, Wednesday, December 24.

----- 1977, National Secondary Drinking Water Regulations, v. 42, no. 62, Thursday, March 31, 1977.

TABLE 1. Chemical analysis of water samples from Hanson, Davison, Hutchinson, and McCook Counties (for map location, see fig. 1)

Sample	Parts Per Million											
	Calcium	Sodium	Magnesium	Chloride	Sulfate	Iron	Manganese	Nitrate	Fluoride	pH	Hardness as CaCO	Total Solids
A	----	---	---	250[2]	250[2]	0.3[2]	0.05[2]	10.0[1]	1.4 2.4[2]	6.5 8.5	----	500[2]
W 1	180	350	72	83	930	7.0	0.65	0.5*	---	--	744	1630
W 2	1150	90	340	63	1850	0.05*	2.25	58	---	--	4260	3620
W 3	750	85	235	6	1400	3.80	0.05	0.5*	---	--	2833	2500
W 4	1000	130	490	350	1400	0.05	0.05*	87	---	--	4503	4284
W 5	840	80	335	49	1550	0.05*	1.50	32	---	--	3468	3008
W 6	1200	180	450	190	1900	0.05*	1.15	54	---	--	4837	4304
W 7	105	330	45	18	510	3.40	0.05	0.5*	---	--	446	1350
W 8	75	240	19	20	85	0.45	0.05*	1.0	---	--	265	824
W 9	165	155	69	14	530	9.50	2.30	0.7	---	--	695	1170
W10	150	375	72	16	940	5.60	1.18	0.5*	---	--	669	1760
W11	70	230	25	21	25*	1.05	0.05*	----	---	--	278	1224
W12	110	280	44	20	490	4.80	0.15	0.5*	---	--	454	1180
W13	170	190	70	14	690	2.00	1.50	0.5*	---	--	711	1330
W14	32	215	15	35	25*	2.50	0.05*	0.5*	---	--	141	820
W15	135	350	62	16	850	0.75	1.17	0.4	---	--	590	1620
W16	350	410	175	23	1650	6.5	0.05*	0.5*	---	--	1590	2850
W17	43	210	25	30	65	5.0	0.05*	0.5*	---	--	209	740
W18	55	244	30	23	145	1.7	0.05*	0.5*	---	--	260	840
W19	70	305	50	20	300	1.2	0.2	0.5	---	--	379	1090
W20	195	370	110	28	1250	1.2	0.05*	0.5*	---	--	937	1960
W21	260	300	140	21	1350	2.5	1.1	0.5*	---	--	1223	2120
W22	45	245	34	32	95	1.8	0.05*	2.0	---	--	252	860
W23	160	295	105	20	820	2.2	0.4	0.5*	---	--	830	1580
W24	380	150	180	109	1400	1.9	0.09	0.5*	---	--	1685	2480
W25	370	230	210	59	1600	0.2	0.14	3.0	---	--	1785	2890
W26	420	105	230	260	1550	0.05*	1.4	50	---	--	1991	4250
W27	350	155	150	75	1150	1.05	0.13	0.5*	---	--	1488	2400
W28	45	531	15	80	700	0.65	0.05*	0.5*	---	--	174	1990
W29	300	250	160	10	1150	5.45	1.10	0.5*	---	--	1405	2680
W30	510	100	310	5	1700	10+	1.00	0.5*	---	--	2550	3400
W31	630	175	770	100	1950	0.31	0.12	58	---	--	4733	6080
W32	190	285	45	99	1000	2.25	0.21	0.5*	---	--	658	1900
W33	315	250	77	133	1400	1.00	0.05	0.5*	---	--	1100	2420
W34	35	215	12	23	55	1.25	0.05*	0.5*	---	--	136	870
W35	125	305	27	55	820	3.15	1.30	0.5*	---	--	422	1500
W36	65	420	12	63	900	0.45	0.05*	2.6	---	--	211	1550
W37	150	285	33	96	840	0.70	0.55	0.5*	---	--	509	1650
W38	325	220	110	45	1150	0.2	0.60	19	---	--	1260	2670
W39	225	105	53	16	620	3.05	0.15	0.5*	---	--	778	1410
W40	245	24	83	12	570	0.05	0.60	2.0	---	--	950	1480
W41	310	35	112	44	960	0.05	0.05*	21	---	--	1230	2040
W42	385	51	105	8	1230	7.50	0.20	0.5*	---	--	1390	2270
W43	370	220	77	148	1250	3.55	0.10	0.5*	---	--	1240	2520
W44	380	150	83	115	1200	9.50	0.25	0.5*	---	--	1200	2420
W45	225	165	51	42	740	0.25	0.05	0.5*	---	--	770	1620
W46	55	270	12	28	500	0.70	0.05*	0.5*	---	--	190	1050
W47	95	268	22	57	625	2.15	0.05*	1.5	---	--	325	1280
W48	105	170	20	28	430	3.10	1.45	0.5*	---	--	344	1010
W49	105	173	18	26	55	1.15	0.05*	0.5*	---	--	335	775?
W50	235	320	58	16	710	4.75	0.8	0.5*	---	--	823	----
W51	35	195	10	25	60	0.90	0.05*	0.5*	---	--	128	780
W52	160	325	50	15	880	4.40	0.95	0.5*	---	--	604	1910

* Less than

Sample A:
[1] National Interim Primary Drinking Water Regulations, Federal Register, December 24, 1975 (enforceable limits)
[2] Proposed National Secondary Drinking Water Regulations, Federal Register, March 31, 1977 (recommended limits)

Water samples were analyzed by the South Dakota Geological Survey

Locations of Water Samples
(for map location, see fig. 1)

W 1 SW SW sec. 8, T. 104 N., R. 57 W., M. J. Kunkel
(depth of well - 159 feet)

W 2 NW NW sec. 1, T. 101 N., R. 57 W., Calvin Hanssen
(depth of well - ?)

W 3 NE NW sec. 2, T. 101 N., R. 57 W., Marvin Klock
(depth of well - 100 feet)

W 4 SW SW sec. 34, T. 102 N., R. 57 W., Robert Buehler
(depth of well - 75? feet)

W 5 NE NE sec. 8, T. 101 N., R. 57 W., Robert Determan
(depth of well - 49 feet)

W 6 SE SE sec. 1, T. 101 N., R. 58 W., Alvin Plagmann
(depth of well - 28 feet)

W 7 SW SE sec. 21, T. 101 N., R. 55 W., Gordon Wollman
(depth of well - 150 feet)

W 8 NW NW sec. 21, T. 101 N., R. 55 W., John Pullman
(depth of well - 130 feet)

W 9 NW NW sec. 20, T. 101 N., R. 55 W., Tom Sperling
(depth of well - ?)

W10 NE NE sec. 17, T. 101 N., R. 55 W., Vernon Weber
(depth of well - 151 feet)

W11 SW SE sec. 20, T. 101 N., R. 55 W., Jacob K. Hofer (see W34)
(depth of well - 145 feet)

W12 SE SW sec. 18, T. 101 N., R. 55 W., Susan Wipf
(depth of well - ?)

W13 SE NE sec. 18, T. 101 N., R. 55 W., Ronald Scarffenberg
(depth of well - ?)

W14 SE SE sec. 30, T. 101 N., R. 55 W., Jacob Wollman
(depth of well - 145 feet)

W15 SW SW sec. 10, T. 101 N., R. 55 W., Clarence Gross
(depth of well - 182 feet)

W16 NE SW sec. 36, T. 101 N., R. 56 W., Dale Garber
(depth of well - ?)

W17 SW NW sec. 33, T. 101 N., R. 55 W., Paul E. Hofer
(depth of well - 150 feet)

W18 NE NW sec. 12, T. 100 N., R. 56 W., R. B. Richert, Hutchinson County (depth of well - 164 feet)

W19 NE SW sec. 27, T. 101 N., R. 55 W., Clifford Wollman (depth of well - ?)

W20 Sec. 9, T. 100 N., R. 56 W., Amos Kliensasser (depth of well - 190 feet)

W21 SE SE sec. 11, T. 101 N., R. 56 W., Larry Eilts (depth of well - 117 feet)

W22 NW NW sec. 11, T. 100 N., R. 56 W., Larry Hofer (depth of well - 130 feet)

W23 SW SW sec. 25, T. 101 N., R. 56 W., Jacob Glanzer (depth of well - 145 feet)

W24 SE NE sec. 20, T. 102 N., R. 59 W., Leo Pollreisz (depth of well - 123 feet)

W25 NE NE sec. 23, T. 102 N., R. 59 W., Rosedale Colony (depth of well - 32? feet)

W26 NW NE sec. 3, T. 102 N., R. 59 W., Orvil Bussmuss (depth of well - ?)

W27 NE NW sec. 3, T. 102 N., R. 59 W., Orvil Bussmuss (depth of well - 220 feet)

W28 SE NE sec. 14, T. 101 N., R. 60 W., Clyde Puetey, Davison County (depth of well - ?)

W29 SE SW sec. 5, T. 101 N., R. 56 W., Myron Letcher (depth of well - 96 feet)

W30 NE NW sec. 21, T. 101 N., R. 56 W., Aloysius Hoffman (depth of well - 100+ feet)

W31 SE NE sec. 31, T. 101 N., R. 56 W., Ruben Reiman (depth of well - 65 feet)

W32 SW SW sec. 2, T. 104 N., R. 58 W., Robert Moe (depth of well - 470 feet)

W33 SW SW sec. 35, T. 105 N., R. 58 W., E. Moe (depth of well - 310 feet)

W34 SW SE sec. 20, T. 101 N., R. 55 W., Jacob K. Hofer (see W11) (depth of well - 145 feet)

W35 SW SW sec. 10, T. 104 N., R. 58 W., Cheeseman
(depth of well - 136 feet)

W36 SE SE sec. 23, T. 104 N., R. 58 W., James Paulson
(depth of well - 315 feet)

W37 NE NW sec. 18, T. 104 N., R. 57 W., C. Pueppke
(depth of well - 320 feet)

W38 SW SW sec. 13, T. 102 N., R. 57 W., Eugene Berg
(depth of well - 36 feet)

W39 SE SE sec. 22, T. 102 N., R. 57 W., G. Lubber
(depth of well - 278 feet)

W40 SW SW sec. 31, T. 102 N., R. 57 W., A. Aulner
(depth of well - 57 feet)

W41 SW SE sec. 4, T. 101 N., R. 57 W., R. Klock
(depth of well - 90 feet)

W42 SE SW sec. 17, T. 101 N., R. 57 W., M. Schrader(?)
(depth of well - 500(?) feet)

W43 NE NW sec. 8, T. 102 N., R. 59 W., Backlund
(depth of well - 128 feet)

W44 NE NE sec. 19, T. 102 N., R. 59 W., H. T. Moore
(depth of well - 148 feet)

W45 NE NE sec. 9, T. 104 N., R. 57 W., Schroeder
(depth of well - 520(?) feet)

W46 NW NW sec. 15, T. 104 N., R. 57 W., Bryant Schroeder
(depth of well - 500 feet)

W47 SW SE sec. 9, T. 104 N., R. 57 W., B. Schroeder
(depth of well - 330 feet)

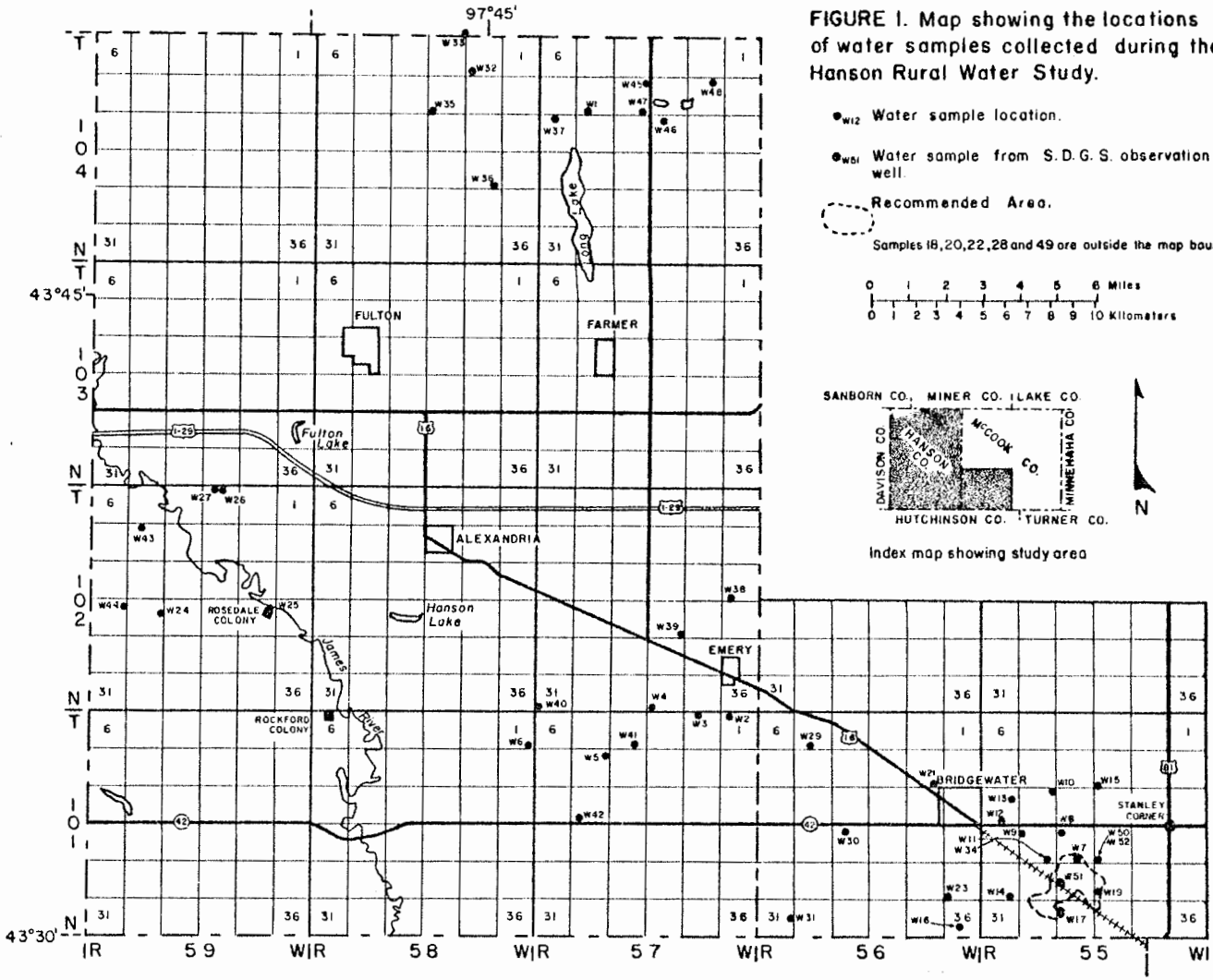
W48 NW NE sec. 11, T. 104 N., R. 57 W., Don Scheuren
(depth of well - 200 feet)

W49 Sec. 5, T. 100 N., R. 55 W., B. Hofer, Hutchinson County
(depth of well - 240 feet)

W50 SW SW sec. 22, T. 101 N., R. 55 W., Hofer
(depth of well - 157 feet)

W51 NW SW sec. 28, T. 101 N., R. 55 W., SD Geological Survey
observation well (depth of well - 160 feet)

W52 SW SW sec. 22, T. 101 N., R. 55 W., Harold Hoffer
(depth of well - ?)



Index map showing study area

FIGURE 1. Map showing the locations of water samples collected during the Hanson Rural Water Study.

●W12 Water sample location.

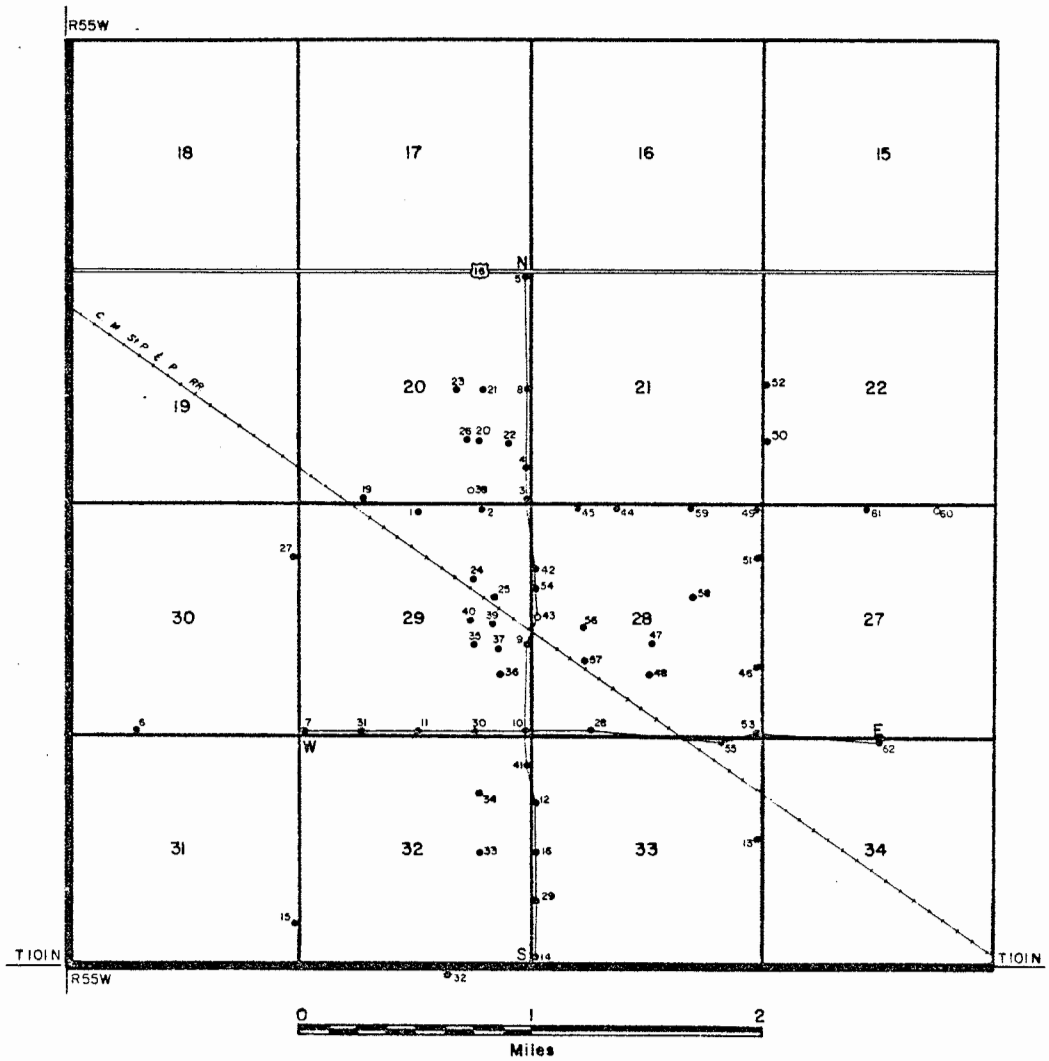
●W51 Water sample from S.D.G.S. observation well.

Recommended Area.

Samples 18, 20, 22, 28 and 49 are outside the map boundaries.

0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 7 8 9 10 Kilometers

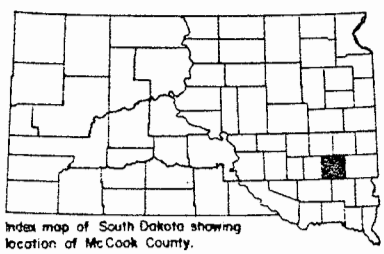


- South Dakota Geological Survey test hole
- o South Dakota Geological Survey observation well

For cross section NS see Figure 2a

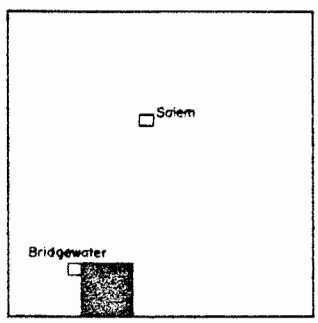
For cross section WE see Figure 2b

Test holes 17 and 18 are outside the map boundaries.



Index map of South Dakota showing location of McCook County.

N



Index map of McCook Co. showing location of this figure.

FIGURE 2

Map showing test hole and observation well locations

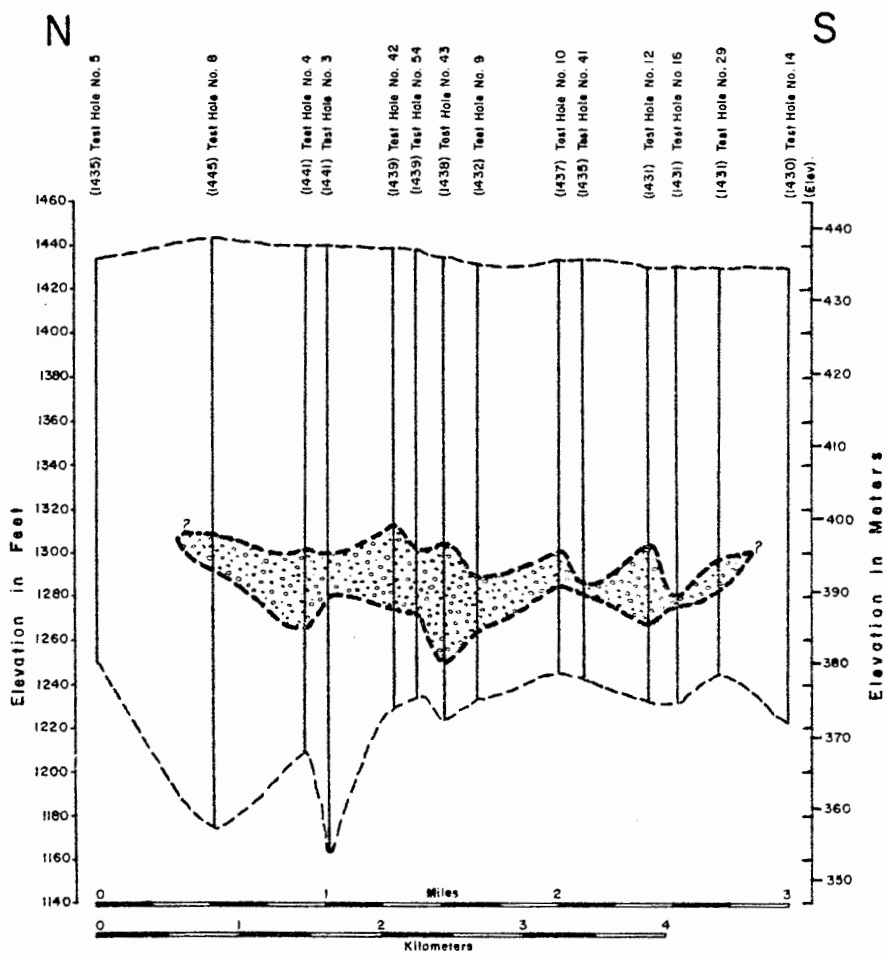


FIGURE 2a

Sand and gravel

Generallized cross-section of saturated sand and gravel from N to S

(See Figure 2 for location)

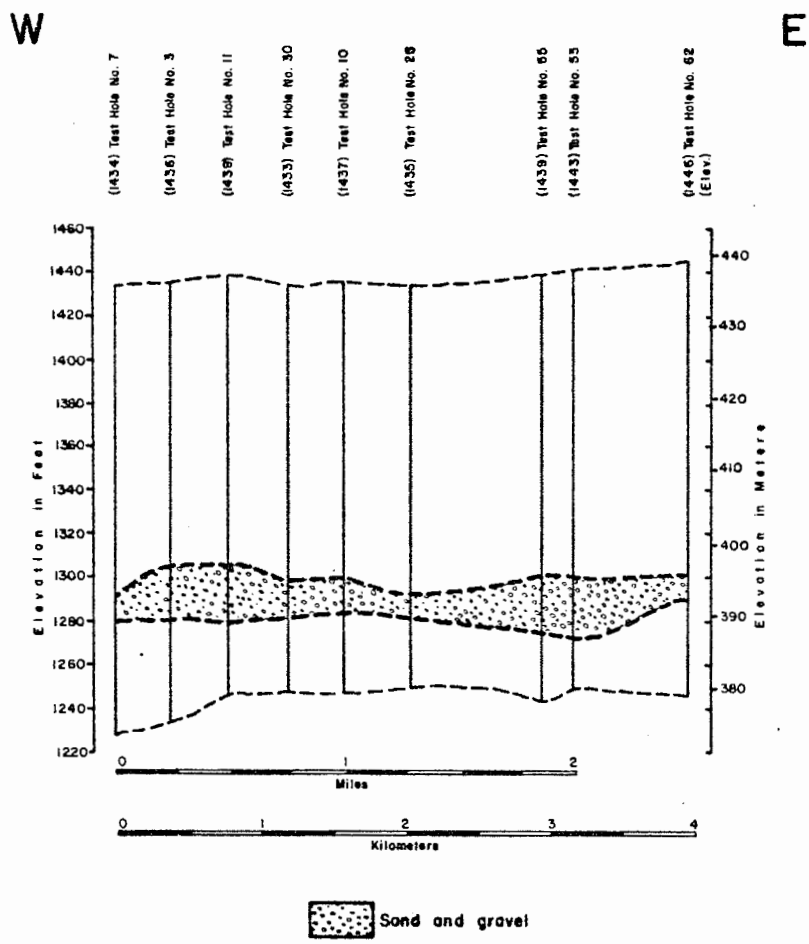
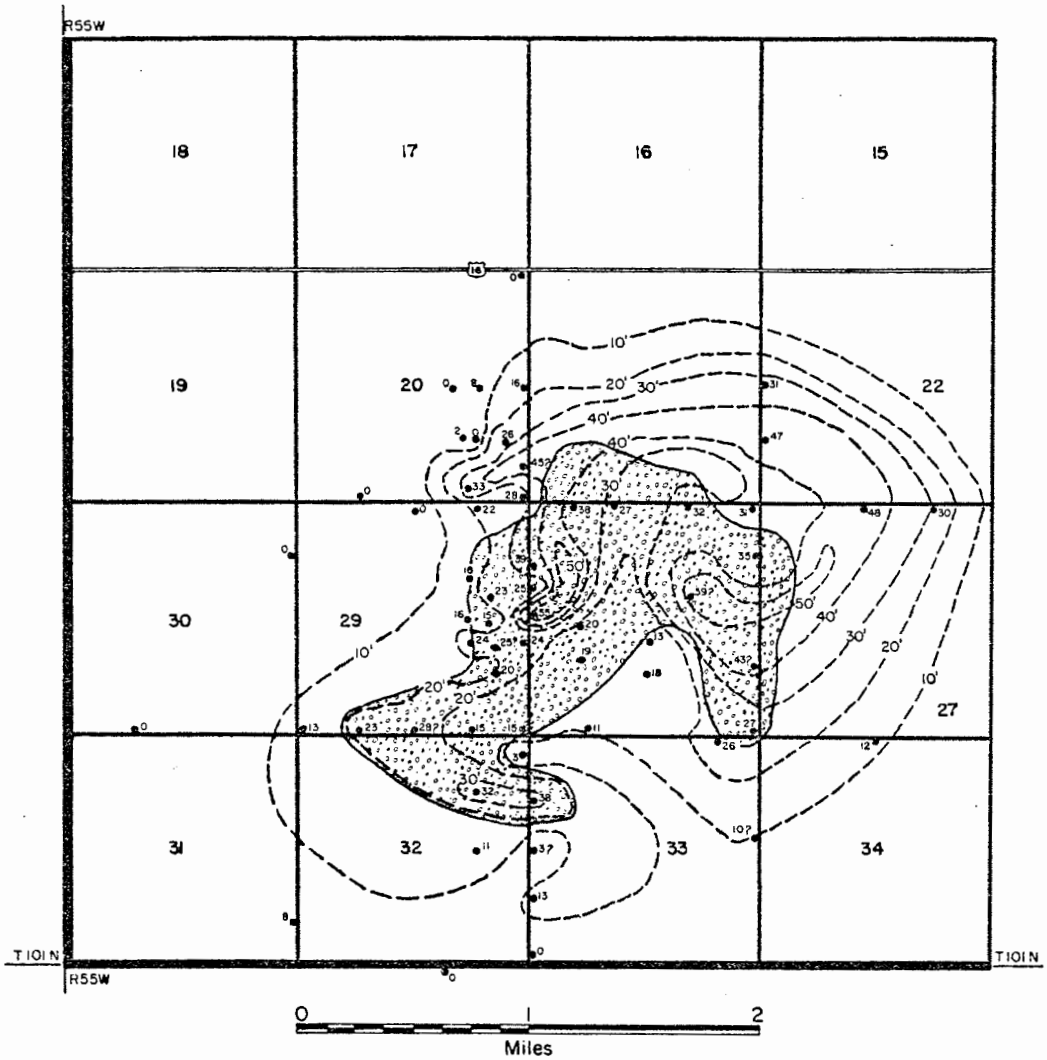


FIGURE 2b

Generallized cross-section of saturated sand and gravel from W to E

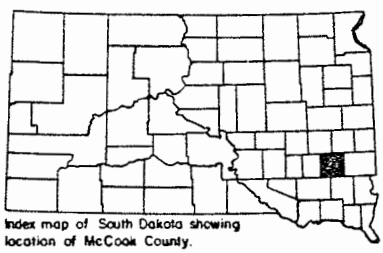
(See Figure 2 for location)



Recommended area

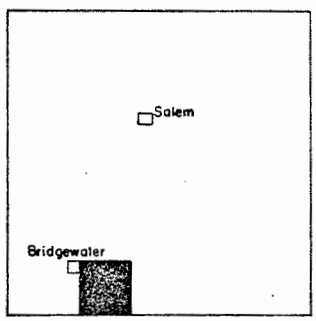
Lines indicating areas of equal thickness of saturated sand and gravel. Contour interval — 10 feet

45 Test hole, number indicates thickness of saturated sand and gravel.



Index map of South Dakota showing location of McCook County.

N



Index map of McCook Co. showing location of this figure.

FIGURE 3

Map showing thickness of saturated sand and gravel

Appendix A

Logs of Test Holes for the
Hanson Rural Water System
(for map location see Fig. 2)

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-1-77 Land Owner:

County: McCook Date: July 26, 1977 Elevation: 1411 (~~XX~~ X, T)

E-Log: No Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	20	Clay, yellow-brown, silty, pebbly (till)	1- 21
	24	Clay, gray, silty, pebbly (till)	21- 45
	36	Clay, gray, sandy, pebbly (till)	45- 81
	19	Clay, gray, gravelly, sandy, some gravel stringers	
		(till)	81-100
	14	Clay, gray, gravelly, sandy (till)	100-114
	84	Clay, gray, sandy, some gravel stringers	114-198
		Quartzite	198
		Total Depth - 200 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NE¼NE¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-2-77 Land Owner:

County: McCook Date: July 26, 1977 Elevation: 1440 (~~XX~~ X T)

E Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Topsoil, black	0- 4
	18	Clay, yellow-brown, silty, pebbly (till)	4- 22
	31	Clay, gray, silty, pebbly (till)	22- 53
	83	Clay, gray, silty, gravelly, some gravel stringers	
		(till)	53-136
	22	Gravel, fine to medium	136-158
	47	Clay, silty, gravelly, rock at 204	158-205
		Total Depth - 205 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-3-77 Land Owner:

County: McCook Date: August 15, 1977 Elevation: 1441 (~~KB~~, ~~K~~, T)

E-Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Topsoil, black	0- 4
	10	Clay, yellow-brown, silty, pebbly (till)	4- 14
	47	Clay, gray, silty, pebbly (till)	14- 61
	15	Clay, gray, more silty, pebbly (till)	61- 76
	6	Clay, gray, silty, gravelly (till)	76- 82
	2	Gravel, fine	82- 84
	57	Clay, gray, silty, gravelly (till)	84-141
	20	Sand, gravel, fine to medium	141-161
	21	Clay, gray, sandy, silty (lake silt?)	161-182
	31	Clay, gray, silty, gravelly, rocks	182-213
	9	Gravel	213-222
	55	Clay, gray, gravelly	222-277
	3	Quartzite	277-280
		Total Depth - 280 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼SE¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-4-77 Land Owner:

County: McCook Date: July 26, 1977 Elevation: 1441 (~~AA~~ ~~X~~ T)

E Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, brown, silty, sandy	0- 2
	9	Clay, yellow-brown, silty, sandy, pebbly (till)	2- 11
	7	Clay, brown, silty, sandy, pebbly (till)	11- 18
	2	Clay, gray-brown, silty, sandy, pebbly (till)	18- 20
	61	Clay, gray, silty, sandy, pebbly (till)	20- 81
	12	Sand, coarse with fine gravel	81- 93
	2	Clay, gray, silty, sandy, pebbly (till)	93- 95
	12	Sand, coarse with fine gravel, some silt	95-107
	31	Clay, gray, silty, sandy, pebbly (till)	107-138
	20	Sand, coarse with fine gravel, silty, wood fragments	138-158
	15	Sand, coarse, fine gravel, shale pebbles	158-173
	59	Clay, gray, silty, sandy, pebbly (till) (?)	173-232
		Quartzite	232
		Total Depth - 232 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-5-77 Land Owner:

County: McCook Date: July 26, 1977 Elevation: 1435 (~~X~~ ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Soil, black, silty, clayey	0- 4
	10	Clay, brown, silty, sandy, pebbly (till)	4- 14
	23	Clay, gray, silty, sandy, pebbly (till)	14- 37
	149	Clay, gray, sandy, silty, pebbly (till)	37-186
		Quartzite	186
		Total Depth - 186 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SE¼SW¼ Section: 30 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-6-77 Land Owner:

County: McCook Date: July 26, 1977 Elevation: 1426 (~~X~~ ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	27	Clay, yellow-brown, silty, pebbly (till)	1- 28
	44	Clay, gray, silty, pebbly (till)	28- 72
	12	Sand and gravel	72- 84
	11	Clay, gray, silty, sandy, gravelly with gravel string-	
		ers (till)	84- 95
	72	Clay, gray, silty, gravelly (till)	95-167
	41	Clay, gray, silty, gravelly with gravel stringers	
		(till)	167-208
	13	Black, gritty, calcareous	208-221
		Quartzite	221
		Total Depth - 221 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SW¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-7-77 Land Owner:

County: McCook Date: July 27, 1977 Elevation: 1434 (~~XX~~ ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	27	Clay, yellow-brown, silty, pebbly (till)	1- 28
	83	Clay, gray, silty, pebbly (till)	28-111
	30	Clay, gray, silty, pebbly, gravelly, some gravel	
		stringers (till)	111-141
	13	Sand and gravel, medium to fine, interbedded silts	141-154
	50	Clay, gray, silty, gravelly, gravel stringers (till)	154-204
		Quartzite (?)	204
		Total Depth - 204 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~S.~~ W.

Well: Test Hole: R-8-77 Land Owner:

County: McCook Date: July 27, 1977 Elevation: 1445 (~~XX~~ X, T)

E Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	17	Clay, yellow-brown, silty, pebbly (till)	2- 19
	18	Clay, gray, silty, pebbly (till)	19- 37
	89	Clay, gray, silty, pebbly (till)	37-126
	2	Sand and gravel	126-128
	8	Clay, gray, silty, gravelly (till)	128-136
	16	Gravel, fine to medium	136-152
	102	Clay, gray, gravelly, some gravel stringers (till)	152-254
	17	Gravel, fine to medium, silty	254-271
		Quartzite	271
		Total Depth - 271 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼NE¼SE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-9-77 Land Owner:

County: McCook Date: July 27, 1977 Elevation: 1432 (~~XX~~, X, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Topsoil, brown, silty, sandy	0- 5
	12	Clay, brown, sandy, silty, pebbly (till)	5- 17
	44	Clay, gray, sandy, silty, pebbly (till)	17- 61
	22	Gravel, fine to medium, clayey, silty	61- 83
	13	Sand, coarse and gravel, fine, silty	83- 96
	47	Clay, gray, sandy, silty, pebbly	96-143
	24	Sand, coarse and gravel, fine, silty	143-167
	23	Clay, gray, sandy, silty, pebbly (till)	167-190
	9	Clay, gray, silty, sandy, pebbly (till) (?)	190-199
		Quartzite	199
		Total Depth - 199 feet	

101-55-29dddd

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well _____ Test Hole: R-10-77 Land Owner: _____

County: McCook Date: July 28, 1977 Elevation: 1437 (~~A~~, ~~X~~ T)

E Log: Yes Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	15	Clay, yellow-brown, silty, pebbly (till)	1- 16
	120	Clay, gray, silty, sandy, pebbly (till)	16-136
	6	Sand, silty	136-142
	9	Gravel, fine to medium	142-151
	39	Clay, gray, sandy, gravelly	151-190
		Total Depth - 190 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SE¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-11-77 Land Owner:

County: McCook Date: July 28, 1977 Elevation: 1439 (~~AX~~ X T)

E-Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	22	Clay, yellow-brown, silty, pebbly (till)	1- 23
	34	Clay, gray, silty, pebbly (till)	23- 57
	53	Clay, gray, sandy, gravelly (till)	57-110
	2	Sand, coarse with gravel, fine	110-112
	19	Clay, gray, sandy, gravelly (till)	112-131
	28	Gravel, fine to medium, wood fragments	131-159
	36	Clay, gray, sandy, gravelly (till)	159-195
	5	Clay (?), black, calcareous	195-200
		Total Depth - 200 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼SW¼NW¼ Section: 33 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-12-77 Land Owner:

County: McCook Date: July 28, 1977 Elevation: 1430 (~~XX~~ ~~X~~, T)

E Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	15	Clay, yellow-brown, silty, pebbly (till)	2- 17
	46	Clay, gray, sandy, pebbly, sand stringers (till)	17- 63
	15	Sand, coarse and gravel, fine with layers of silt	
		and clay	63- 78
	21	Clay, gray, sandy, pebbly (till)	78- 99
	27	Clay, gray, silty, sandy, pebbly, some rocks	99-126
	38	Sand, coarse and gravel, fine, silty, shale pebbles	126-164
	36	Clay, gray, sandy, pebbly	164-200
		Quartzite	200
		Total Depth - 200 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼NE¼ Section: 33 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-13-77 Land Owner: _____

County: McCook Date: August 30, 1977 Elevation: 1439 (~~XX~~ ~~X~~, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	22	Clay, yellow-brown, silty, sandy (till)	0- 22
	30	Clay, gray, silty, sandy, pebbly (till)	22- 52
	7	Clay, gray, silty, sandy, gravelly (till)	52- 59
	2	Clay, gray, sandy, silty, pebbly (till)	59- 61
	30	Silt, sandy	
		Note: 80' sample; clay, gray, sandy, silty, gravelly;	
		sample taken after driller reamed hole	61- 91
	9	Sand, gravel, medium to coarse	91-100
	13	Clay, gray, sandy, pebbly, some lignite (till)	100-113
		Note: Thin layer of yellow-brown silt.	
	35	Clay, gray, sandy, silty, pebbly (till)	113-148
	10	Sand, medium to coarse, some fragments of light-gray	
		chalk (?)	148-158
	12	Silt, sandy	158-170
	15	Clay, gray, sandy, silty, pebbly, gravel stringers;	
		till	170-185
		Total Depth - 185 feet	

101-55-33cccc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SW¼ Section: 33 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-14-77 Land Owner:

County: McCook Date: July 29, 1977 Elevation: 1430 (~~XX~~ X T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	14	Clay, yellow-brown, silty, pebbly (till)	2- 16
	22	Clay, gray, silty, pebbly (till)	16- 38
	145	Clay, gray, sandy, gravelly (till)	38-183
	3	Rocks	183-186
		Quartzite	186
		Total Depth - 186 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼SE¼SE¼ Section: 31 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-15-77 Land Owner: _____

County: McCook Date: July 29, 1977 Elevation: 1431 (~~XX~~ X, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black, silty	0- 1
	30	Clay, brown, silty, sandy, pebbly (till)	1- 31
	19	Clay, gray, silty, sandy, pebbly (till)	31- 50
	23	Clay, gray, sandy, silty, pebbly	50- 73
	13	Sand, fine to medium, silty, clayey	73- 86
	43	Clay, gray, sandy, silty, pebbly	86-129
	8	Sand, coarse and gravel, fine, silty	129-137
	71	Clay, gray, silty, sandy, pebbly (till)	137-208
		Quartzite	208
		Total Depth - 208 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼SW¼ Section: 33 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-16-77 Land Owner:

County: McCook Date: July 28, 1977 Elevation: 1432 (~~MSL~~ ~~G~~ T)

E Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Soil, brown, silty, sandy	0- 3
	13	Clay, brown, silt, sand, pebbles	3- 16
	36	Clay, gray, (unoxidized) w/silt, sand and pebbles	16- 52
	2	Gravel, fine to medium	52- 54
	24	Clay, gray, sandy, gravelly (till)	54- 78
	2	Gravel	78- 80
	71	Clay, gray, sandy; very gravelly w/gravel stringers	80-151
	3	Gravel, medium to fine	151-154
	37	Clay, gray, sandy, gravelly (till)	154-191
	6	Black, organic (?), calcareous	191-197
	3	Rock (Quartzite ?)	197-200
		Total Depth - 200 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NE¼ Section: 18 T. 101 N. ~~S.~~ R. 54 ~~E.~~ W.

Well: Test Hole: R-17-77 Land Owner:

County: McCook Date: August 29, 1977 Elevation: (A, I, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data: Vermillion River

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, sandy	0- 2
	6	Sand, medium to coarse	2- 8
	10	Clay, gray, silty, pebbly (till (?))	8- 18
	38	Clay, gray, silty, sandy, pebbly (till)	18- 56
	26	Clay, gray, silty, pebbly (till)	56- 82
	2	Sand, fine	82- 84
	5	Clay, gray, silty, gravelly (till)	84- 89
	16	Sand, medium	89-105
	8	Clay, gray, silty, pebbly (till)	105-113
	15	Clay, gray, sandy, silty (till)	113-128
	7	Sand, medium	128-135
	17	Clay, gray, sandy, silty, interbedded sand layers	
		(till)	135-152
	7	Silt, gray	152-159
	0.5	Limestone (?)	159-159.5
		Total Depth - 159.5 feet	
		NOTE: Test hole is not shown in FIGURE 2.	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 28 T. 101 N. ~~S~~ R. 56 ~~E~~. W.

Well: _____ Test Hole: R-18-77 Land Owner: _____

County: McCook Date: July 28, 1977 Elevation: _____ (~~XX~~ ~~X~~, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, dark-brown, silty	0- 1
	27	Clay, yellow-brown, silty, pebbly (till)	1- 28
	14	Clay, yellow-gray, silty, pebbly (till)	28- 42
	26	Clay, gray, silty, pebbly (till)	42- 68
	7	Sand, gray, silty	68- 75
	13	Clay, gray, silty, pebbly (till)	75- 88
	6	Clay, silty (till) (?)	88- 94
	16	Chalk (?), gray	94-110
		Total Depth - 110 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SE¼SW¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-19-77 Land Owner:

County: McCook Date: August 1, 1977 Elevation: 1434 (~~XX~~, ~~X~~, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	29	Clay, yellow-brown, silty, pebbly (till)	1= 30
	63	Clay, gray, silty, gravelly (till)	30- 93
	1	Gravel	93- 94
	20	Clay, gray, silty, gravelly (till)	94-114
	2	Gravel, coarse	114-116
	15	Clay, gray, sandy, gravelly (till)	116-131
	39	Clay, gray, sandy, gravelly	131-170
	44	Clay, gray, sandy, gravelly (till)	170-214
		Quartzite	214
		Total Depth - 214 feet	

101-55-20dacc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼NE¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-20-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 2, 1977 Elevation: 1443 (~~XX~~ X, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	45	Clay, yellow-brown, silty, pebbly (till)	2- 47
	125	Clay, gray, silty, pebbly (till)	47-172
	48	Clay, sandy, pebbly (till)	172-220
	60	Clay, gray, sandy, pebbly, rocks	220-280
		Quartzite	280
		Total Depth - 280 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NE¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-21-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 1, 1977 Elevation: 1436 (~~XX~~, ~~X~~, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Topsoil, black	0- 4
	11	Clay, yellow-brown, silty, pebbly (till)	4- 15
	10	Clay, gray, silty, pebbly	15- 25
	20	Clay, gray, sandy (till)	25- 45
	89	Clay, gray, sandy, pebbly	45-134
	8	Gravel, fine to medium	134-142
	42	Clay, gray, sandy, gravelly, silty (till)	142-184
	31	Clay, gray, silty, gravelly (till)	184-215
	17	Same as above with rocks	215-232
	11	Clay, gray, silty, gravelly (till)	232-243
	26	Gravel	243-269
	5	Clay, gray, gravelly (till) (?)	269-274
		Quartzite	274
		Total Depth - 274 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼NE¼SE¼ Section: 20 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-22-77 Land Owner: Jacob K. Hofer

County: McCook Date: Elevation: (A, I, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, gray, silty	0- 2
	23	Clay, yellow, silty, pebbly (till)	2- 25
	38	Clay, gray, silty, sandy, pebbly (till)	25- 63
	4	Gravel, fine and sand, coarse	63- 67
	6	Silt, light-gray	67- 73
	2	Gravel, medium	73- 75
	22	Clay, gray, silty, sandy (till)	75- 97
	2	Sand, coarse and gravel, fine	97- 99
	24	Clay, gray, sandy (till)	99-123
	4	Gravel, fine to medium	123-127
	9	Clay, gray, sandy (till)	127-136
	10	Gravel, fine	136-146
	6	Sand, fine to medium	146-152
	10	Gravel, fine	152-162
	22	Clay, silty, pebbly (till)	162-184
	36	Clay, gray, sandy, pebbly, with thin layers of gravel	
		(till)	184-220
	28	Clay, gray, shaley, silty (till)	220-248
	2	Gravel, coarse	248-250
		Quartzite	250

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NE¼NW¼SE¼ Section: 20 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-23-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 2, 1977 Elevation: 1435 (~~A.~~ ~~X.~~ T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, gray, sandy	0- 2
	31	Clay, yellow-tan, silty, pebbly (till)	2- 33
	69	Clay, gray, silty, sandy, pebbly (till)	33-102
	40	Clay, gray, silty, pebbly (till)	102-142
	8	Clay, gray, shaley, silty (till)	142-150
	30	Chalk (?), gray, soft	150-180
	17	Shale (?), light-gray	180-197
	13	Sand, fine to medium, clayey	197-210
	34	Clay, gray, sandy, silty (till)	210-244
		Quartzite	244
		Total Depth - 244 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼SE¼NE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-24-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 3, 1977 Elevation: 1440 (~~XX~~, ~~X~~, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	16	Clay, yellow-brown, silty, pebbly (till)	2- 18
	77	Clay, gray, silty, pebbly (till)	18- 95
	33	Clay, gray, sandy, gravelly, gravel stringers (till)	95-128
	6	Clay, gray, sandy (till)	128-134
	19	Gravel	134-153
	41	Clay, gray, sandy, gravelly	153-194
		Quartzite (?)	194
		Total Depth - 194 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SW¼SE¼NE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-25-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 3, 1977 Elevation: 1440 (~~XX~~ X, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	26	Clay, yellow-brown, silty, pebbly (till)	2- 28
	106	Clay, gray, silty, pebbly (till)	28-134
	2	Gravel	134-136
	2	Sand, silty	136-138
	19	Gravel	138-157
	8	Clay, silty, sandy, pebbly (till)	157-165
	33	Clay, gray, silty, pebbly (till)	165-198
	7	Gravel, medium	198-205
		Quartzite	205
		Total Depth - 205 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼NW¼SE¼ Section: 20 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-26-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 2, 1977 Elevation: 1440 (~~XX~~ ~~X~~ T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, gray, silty	0- 2
	32	Clay, yellow-tan, silty, pebbly (till)	2- 34
	29	Clay, gray, sandy, silty, pebbly (till)	34- 63
	10	Sand, medium	63- 73
	38	Clay, gray, sandy, silty (till)	73-111
	5	Gravel, fine to medium	111-116
	1	Clay, gray, silty (till)	116-117
	3	Sand, fine to medium	117-120
	19	Clay, gray, silty, pebbly (till)	120-139
	2	Gravel, fine	139-141
	16	Clay, silty, pebbly, some chalk (?) (till)	141-157
	41	Shale (?), silty, gray	157-198
	20	Clay, gray, sandy, shaley (till)	198-218
	13	Clay, gray, shaley, interbedded gravel	218-231
	37	Clay, gray, sandy, hard	231-268
	1	Gravel, hard layers (cemented ?)	268-269
	1	Quartzite	269-270
		Total Depth - 270 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼NE¼NE¼ Section: 30 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-27-77 Land Owner:

County: McCook Date: August 4, 1977 Elevation: 1430 (~~AX~~ ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, gray, silty	0- 1
	17	Clay, yellow, silty, pebbly (till)	1- 18
	84	Clay, gray, silty, pebbly (till)	18-102
	28	Clay, gray, silty, pebbly, rocks and gravel stringer	
		(till)	102-130
	15	Clay, gray, sandy, silty, pebbly (till)	130-145
		Note: Black organic (?) material in 140' sample	
	54	Clay, gray, silty, sandy, pebbly (till)	145-199
	1	Gravel	199-200
	8	Clay, gray, sandy, pebbly; silt, greenish-tan and	
		rocks	200-208
		Quartzite	108
		Total Depth - 108 feet	

101-55-28cdcc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SE¼SW¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-28-77 Land Owner:

County: McCook Date: August 4, 1977 Elevation: 1435 (~~AX~~ X T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	18	Clay, yellow-brown, silty, pebbly (till)	1- 19
	89	Clay, gray, silty, sandy, pebbly	19-108
	9	Gravel	108-117
	13	Clay, gray, sandy, gravelly (till)	117-130
	3	Gravel	130-133
	9	Clay, gray, sandy, gravelly (till)	133-142
	11	Gravel	142-153
	31	Clay, gray, sandy, silty (till) (?)	153-184
		Quartzite (?)	184
		Total Depth - 184 feet	

101-55-33cbcc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼NW¼SW¼ Section: 33 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-29-77 Land Owner: _____

County: McCook Date: August 5, 1977 Elevation: 1431 (~~AX~~ ~~X~~, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black, clayey	0- 1
	1	Silt, dark-gray to black	1- 2
	15	Clay, yellow, silty, pebbly (till)	2- 17
	1	Clay, brown, silty, pebbly (till)	17- 18
	14	Clay, gray, silty, sandy, pebbly (till)	18- 32
	104	Gravel	32-136
	3	Clay, gray, sandy, gravelly (till)	136-139
	6	Gravel	139-145
		Note: Wood fragments from 132' to 145'	
	41	Clay, gray, sandy, gravelly (till)	145-186
		Quartzite (?)	186
		Total Depth - 186 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SE¼SE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-30-77 Land Owner:

County: McCook Date: August 5, 1977 Elevation: 1433 (~~XX~~ ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	12	Clay, yellow-brown, silty, pebbly (till)	1- 13
	20	Clay, gray, silty, pebbly (till)	13- 33
	65	Clay, gray, sandy, silty, pebbly (till)	33- 98
	36	Clay, gray, silty, gravelly (till)	98-134
	4	Gravel	134-138
	5	Clay, gray, gravelly, sandy (till)	138-143
	6	Gravel	143-149
	35	Clay, gray, silty, sandy, pebbly (till)	149-184
		Quartzite (?)	184
		Total Depth - 184 feet	

101-55-29cdcc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SE¼SW¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-31-77 Land Owner:

County: McCook Date: August 8, 1977 Elevation: 1436 (~~XX~~ ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty, sandy	0- 2
	15	Clay, brown, sandy, silty, pebbly (till)	2- 17
	15	Clay, gray, silty, sandy, pebbly (till)	17- 32
	52	Clay, gray, sandy, silty, pebbly (till)	32- 84
	17	Sand, silty, some clay	84-101
	29	Clay, gray, sandy, silty, pebbly (till)	101-130
	23	Gravel, fine, silty	130-153
	44	Clay, gray, silty, sandy, pebbly (till)	153-197
		Quartzite	197
		Total Depth - 197 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NE¼NW¼NE¼ Section: 8 T. 100 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-32-77 Land Owner:

County: Hutchinson Date: August 8, 1977 Elevation: 1430 (~~XX~~ ~~X~~ T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	20	Clay, yellow, silty, pebbly (till)	2- 22
	83	Clay, gray, silty, sandy, some layers of yellow clay	
		(till)	22-105
	1	Gravel, medium	105-106
	64	Clay, gray, sandy, some thin yellow clay layers (till)	106-170
	17	Clay, gray, sandy, gravel stringers (till)	170-187
	8	Clay, gray, silty, pebbly (till)	187-195
		Quartzite	195
		Total Depth - 195 feet	

101-55-32dabb

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NE¼SE¼ Section: 32 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-33-77 Land Owner: Bill Rinehart

County: McCook Date: August 8, 1977 Elevation: 1430 (~~XX~~ X, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	4	Clay, yellow-brown, silty, pebbly (till)	2- 6
	17	Clay, yellow-tan, silty, pebbly (till)	6- 23
	109	Clay, gray, silty, sandy, lignite at 103' (till)	23-132
	11	Clay, silty, soft (till)	132-143
	11	Gravel, fine, some coarse sand	143-154
	29	Silt, some thin gravel layers, wood fragments	154-183
	4	Gravel, medium to coarse, shaley	183-187
	13	Clay, gray, silty, pebbly, sandy (till)	187-200
	2	Gravel, medium to coarse	200-202
	4	Clay, gray, pebbly, interbedded layers of coarse	
		gravel (till)	202-206
	5	Gravel	206-211
	4	Clay, gray, shaley (till)	211-215
	1	Silt (?), pinkish-white	215-216
	14	Gravel, coarse with interbedded layers of clay	216-230
	7	Shale (?), dark-gray, hard	230-237
		Quartzite	237-
		Total Depth - 237 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼NE¼NE¼ Section: 32 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-34-77 Land Owner: Bill Rinehart

County: McCook Date: August 8, 1977 Elevation: 1432 (~~A~~, ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil	0- 2
	4	Clay, yellow-orange, silty, pebbly (till)	2- 6
	18	Clay, yellow-tan, silty, pebbly (till)	6- 24
	101	Clay, gray, silty, sandy (till)	24-125
	32	Gravel, fine to medium, silty	125-157
	34	Clay, gray, silty, sandy, pebbly (till)	157-191
		Quartzite	191
		Total Depth - 191 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼NE¼SE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-35-77 Land Owner: Bill Rinehart

County: McCook Date: August 10, 1977 Elevation: 1435 (~~XX~~, ~~X~~, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, black, silty	0- 3
	4	Clay, brown, silty, sandy (till)	3- 7
	5	Clay, brown, sandy, silty, pebbly (till)	7- 12
	12	Clay, brown, silty, sandy, pebbly (till)	12- 24
	103	Clay, gray, sandy, silty, pebbly, layers of sand at	
		100' and 107' (till)	24-127
	24	Sand, coarse and gravel, fine to medium, silty	127-151
	58	Clay, gray, silty, sandy (till)	151-209
		Quartzite	209
		Total Depth - 209 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼NE¼SE¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: _____ Test Hole: R-36-77 Land Owner: Bill Rinehart

County: McCook Date: August 10, 1977 Elevation: 1435 (~~XX~~ ~~X~~ T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black, silty	0- 2
	3	Silt, brown, sandy	2- 5
	13	Clay, yellow, silty, pebbly (till)	5- 18
	6	Clay, brown to gray, silty, pebbly (till)	18- 24
	105	Clay, gray, sandy, silty (till)	24- 129
	20	Gravel (fine to medium), sand, coarse, silty,	
		interbedded layers of silt and clay	129-149
	64	Clay, gray, silty, sandy, pebbly (till)	149-213
		Quartzite	213
		Total Depth - 213 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SW¼NE¼SE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-37-77 Land Owner: Bill Rinehart

County: McCook Date: August 11, 1977 Elevation: 1434 (~~XY~~ X, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black, silty, clayey	0- 2
	7	Silt, tan, clayey	2- 9
	9	Clay, brown, silty, sandy, pebbly (till)	9- 18
	84	Clay, gray, sandy, silty, pebbly (till)	18-102
	9	Clay, gray, silty, sandy, pebbly (till)	102-111
	5	Clay, gray, sandy, silty, pebbly (till)	111-116
	6	Sand? very fine, silt	116-122
	25	Gravel, fine and sand, coarse, silty	122-147
	7	Gravel? medium to coarse, silty	147-154
	4	Clay, gray, silty, sandy, pebbly (till)	154-158
	5	Gravel, fine to medium, some coarse sand	158-163
	39	Clay, gray, silty, sandy, pebbly (till)	163-202
		Quartzite	202
		Total Depth - 202 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SW¼SE¼ Section: 20 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-38-77 Land Owner: Jacob K. Hofer

County: McCook Date: August 11, 1977 Elevation: 1440 (~~XX~~, ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Gravel, coarse	0- 1
	1	Clay, black, silty	1- 2
	26	Clay, yellow, silty, pebbly (till)	2- 28
	4	Clay, gray, silty, pebbly (till)	28- 32
	108	Clay, gray, silty, sandy, pebbly (till)	32-140
	10	Gravel, fine to medium, some lignite and shale pebbles	140-157
	7	Gravel, medium to coarse, sand, coarse	150-157
	1	Clay, sandy, dark-gray	157-158
	15	Gravel, coarse and sand, coarse	158-173
	8	Clay, gray, sandy (till)	173-181
	4	Chalk (?), sandy	181-185
		Total Depth 185 feet	
		Observation well - set at 150, 3 feet above ground	
		Water Level - Approximately 60' 4"	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NW¼NE¼SE¼ Section: 29 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-39-77 Land Owner:

County: McCook Date: August 11, 1977 Elevation: 1435 (~~XX~~, ~~X~~, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	2	Clay, yellow-orange, silty, pebbly (till)	2- 4
	10	Clay, yellow-tan, silty, pebbly (till)	4- 14
	118	Clay, gray, silty, sandy, pebbly (till)	14-132
	8	Sand, fine to medium	132-140
	7	Gravel, fine to medium and sand, coarse	140-147
	18	Silt, gray (lake silts)	147-165
	30	Clay, gray, silty, pebbly (till)	165-195
	3	Gravel, coarse, some clay layers	195-198
	1	Clay, gray, pebbly (till)	198-199
	2	Gravel, coarse	199-201
	2	Clay, dark-gray, sandy (till)	201-203
	4	Shale, black, some bentonite (?)	203-207
		Quartzite	207
		Total Depth - 207 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NW¼SE¼ Section: 29 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-40-77 Land Owner: Bill Rinehart

County: McCook Date: August 11, 1977 Elevation: 1430 (~~XX~~ X, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	3	Clay, yellow-orange, silty, pebbly (till)	2- 5
	14	Clay, yellow, silty, pebbly (till)	5- 19
	9	Clay, gray, silty, pebbly (till)	19- 28
	108	Clay, gray, sandy, pebbly (till)	28-136
	6	Gravel, fine, sandy, silty	136-142
	10	Gravel, medium to coarse, silty	142-152
	29	Clay, gray, sandy, silty, pebbly (till)	152-181
	2	Gravel, fine to medium	181-183
	11	Clay, gray, silty, sandy, pebbly (till)	183-194
	9	Chalk, light-pink, hard drilling, wood fragments and	
		sand	194-203
		Quartzite	203
		Total Depth - 203 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼NE¼NE¼ Section: 32 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-41-77 Land Owner:

County: McCook Date: August 11, 1977 Elevation: 1436 (~~X~~, ~~X~~, T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Soil, dark-brown, silty, sandy	0- 2
	3	Clay, brown, silty	2- 5
	11	Clay, brown, sandy, pebbly (till)	5- 16
	67	Clay, gray, silty, sandy, pebbly (till)	16- 83
	3	Sand and gravel, fine	83- 86
	45	Clay, gray, sandy, pebbly (till)	86-131
	18	Clay, gray, silty (till)	131-149
	3	Gravel, coarse	149-152
	5	Silt, gray, pebbly (till)	152-157
	29	Clay, gray, silty, sandy	157-186
	5	Gravel, very coarse, interbedded with clay	186-191
	2	Clay, gray	191-193
		Quartzite	193
		Total Depth - 193 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼SW¼NW¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-42-77 Land Owner:

County: McCook Date: August 17, 1977 Elevation: 1439 (~~X~~, ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	21	Clay, yellow-brown, silty, pebbly (till)	1- 22
	88	Clay, gray, silty, pebbly (till)	22-110
	2	Gravel	110-112
	14	Clay, gray, gravelly, pebbly (till)	112-126
	14	Gravel, fine, slightly cemented, silty	126-140
	25	Gravel, fine to medium, coarse from 155-168	140-165
	9	Silt, gray, gravel stringers and rocks	165-174
	33	Clay, gray, silty, gravelly, rocks (till)	174-207
		Quartzite	207
		Total Depth - 210 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼NW¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-43-77 Land Owner:

County: Date: August 17, 1977 Elevation: 1438 (~~AX~~ ~~X~~, T)

E-Log: Yes Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	14	Clay, yellow-brown, silty, pebbly (till)	0- 14
	34	Clay, gray, silty, pebbly (till)	14- 48
	34	Clay, gray, silty, pebbly (till)	48- 82
	5	Gravel, fine and sand, coarse	82- 87
	25	Clay, gray, sandy, gravelly (till)	87-112
	2	Gravel, medium with interbedded clay, oxidized	112-114
	19	Clay, gray, gravelly with oxidized till	114-133
	15	Gravel, fine to medium	133-148
	24	Gravel, medium to coarse	148-172
	16	Gravel, fine to medium	172-188
	15	Clay, gray, silty, gravelly, marl (?) (till)	188-203
	8	Shale (?), black	203-211
	1	Gravel	211-212
	1	Shale, black, gravel	212-213
	2	Quartzite	213-215
		Water Level = 52 feet	
		Total Depth - 215 feet	
		Installed 4" PVC - Bottom of 5' sandpoint at 160'.	
		Slotted 10' of PVC above 5' sandpoint. A rate of	
		flow of approximately 70 gallons/minute was measured	

using an air compressor, a 5 gallon measure and wrist watch.

101-55-28baba

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NW¼NE¼NW¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-44-77 Land Owner:

County: McCook Date: August 17, 1977 Elevation: 1441 (~~XX~~ ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	23	Clay, yellow-brown, silty, pebbly (till)	0- 23
	51	Clay, gray, silty, pebbly (till)	23- 74
	1	Gravel, fine to medium	74- 75
	52	Clay, gray, silty, pebbly (till)	75-127
	27	Sand, coarse and gravel, fine, silty, some coarse	
		gravel at 154'	127-154
	9	Clay, gray, silty, sandy, pebbly (till)	154-163
	4	Gravel, fine to medium, silty	163-167
	11	Clay, gray, sandy, silty, pebbly (till)	167-178
	25	Sand, fine, interbedded with silt and clay	178-203
	18	Clay, gray, silty, sandy, pebbly (till)	203-221
		Quartzite (?)	221
		Total Depth - 221 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NW¼NW¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-45-77 Land Owner:

County: McCook Date: August 17, 1977 Elevation: 1438 (~~XY~~ ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, brown, silty, sandy, pebbly (till)	0- 3
	11	Clay, brown, silty, sandy, pebbly (till)	3- 14
	8	Clay, gray-brown, silty, sandy, pebbly (till)	14- 22
	102	Clay, gray, silty, sandy, pebbly (till)	22-124
	5	Gravel, medium to coarse	124-129
	3	Clay and silt, sandy	129-132
	8	Gravel, fine to medium with silt and sand	132-140
	22	Gravel, fine to medium, clean	140-162
	16	Silt and clay (lake deposit (?))	162-178
	28	Clay, gray, silty, sandy, pebbly (till)	178-206
		Quartzite	206
		Total Depth - 206 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼NE¼SE¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: Test Hole: R-46-77 Land Owner:

County: McCook Date: August 8, 1977 Elevation: 1444 (~~XX~~ ~~X~~ T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black, silty	0- 2
	3	Silt and sand	2- 5
	9	Clay, brown, silty, sandy, pebbly (till)	5- 14
	52	Clay, gray, silty, sandy, pebbly (till)	14- 66
	6	Gravel, fine to medium	66- 72
	54	Clay, gray, silty, sandy, pebbly (till)	72-126
	5	Gravel, fine to medium	126-131
	10	Clay, gray, silty, sandy, pebbly (till)	131-141
	28	Gravel, fine to medium and sand, coarse, silty	141-169
	43	Clay, gray, silty, sandy, pebbly (till)	169-212
		Quartzite	212
		Total Depth - 212 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼NW¼SE¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-47-77 Land Owner: _____

County: McCook Date: August 18, 1977 Elevation: 1440 (~~AX~~ ~~X~~ T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, black	0- 3
	17	Clay, yellow-brown, silty, pebbly (till)	3- 20
	21	Clay, gray, silty, pebbly (till)	20- 41
	1	Gravel, fine to medium	41- 42
	63	Clay, gray, gravelly, silty (till)	42-105
	14	Clay, gray, silty, gravelly (till)	105-119
	5	Clay, gray, gravelly, silty (till)	119-124
	11	Clay, gray, silty, gravelly (till)	124-135
	6	Clay, sandy, gravelly	135-141
	9	Gravel, fine to medium, silty	141-150
	4	Gravel, medium to coarse	150-154
	21	Sandy (?), gray, silty; rock at 175'	154-175
	27	Clay, gray, silty, gravelly (till)	175-202
		Quartzite	202
		Total Depth - 202 feet	

101-55-28dbcc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼NW¼SE¼ Section: 28 T. 101 N. ~~XX~~ R. 55 ~~XX~~ W.

Well _____ Test Hole: R-48-77 Land Owner: _____

County: McCook Date: August 18, 1977 Elevation: 1435 (~~XX~~, ~~XX~~ T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, black	0- 3
	13	Clay, yellow-brown, silty	3- 16
	26	Clay, gray, silty, pebbly (till)	16- 42
	1	Gravel, fine, sandy	42- 43
	65	Clay, gray, silty, gravelly; Rock at 108'	43-108
	28	Clay, gray, sandy, gravelly - rocks and gravel stringer	108-136
	5	Gravel, fine to medium, sandy	136-141
	9	Clay, gray, sandy, gravelly (till(?))	141-150
	9	Gravel, medium to coarse	150-159
	6	Silt (lake deposit (?)); rock at 165'	159-165
	40	Clay, gray, silty, gravelly (till)	165-205
	6	Gravel	205-211
	3	Clay, gray, gravelly, silty	211-214
		Quartzite	
		Total Depth - 215 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 28 T. 101 N. ~~X~~ R. 55 ~~X~~ W.

Well: _____ Test Hole: R-49-77 Land Owner: _____

County: McCook Date: August 18, 1977 Elevation: 1446 (~~XXX~~ K T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, brown, silty	0- 3
	24	Clay, brown, silty, sandy, pebbly (till)	3- 27
	39	Clay, gray, silty, sandy, pebbly (till)	27- 66
	75	Clay, gray, sandy, silty, pebbly (till)	66-141
		Sand and gravel from 127 to 129.	
	31	Gravel, fine to medium and sand, coarse, clean	141-172
	5	Silt and clay, sandy	172-177
	49	Clay, gray, silty, sandy, pebbly (till)	177-226
		Quartzite	226
		Total Depth - 226 feet	

101-55-22cbcc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼NW¼SW¼ Section: 22 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-50-77 Land Owner: _____

County: McCook Date: August 18, 1977 Elevation: 1444 (~~XX~~ ~~X~~, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, brown, silty, sandy	0- 3
	24	Clay, brown, silty, sandy, pebbly (till)	3- 27
	25	Clay, gray, silty, sandy, pebbly (till) (fine gravel	
		from 44-47)	27- 52
	22	Gravel, fine to medium with clay layers	52- 74
	9	Clay, gray, silty, sandy, pebbly (till)	74- 83
	18	Sand, coarse and gravel, fine, some interbedded silty	
		clay	83-101
	46	Clay, gray, sandy, silty, pebbly (till)	101-147
	21	Gravel, fine to medium, sandy	147-168
	26	Gravel, medium to coarse	168-194
	24	Clay, gray, silty, sandy, pebbly (till)	194-218
		Abandoned hole at 218' - Plugged bit	
		Total Depth - 218 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼NE¼NE¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: _____ Test Hole: R-51-77 Land Owner: _____

County: McCook Date: August 19, 1977 Elevation: 1444 (~~XX~~ ~~X~~ T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	23	Clay, yellow-brown, silty, pebbly (till)	1- 24
	17	Clay, grya, silty, pebbly (till)	24- 41
	1	Gravel, fine to medium	41- 42
	36	Clay, gray, sandy, gravelly with gravel stringers	
		(till)	42- 78
	41	Clay, gray, silty, gravelly (till)	78-119
	2	Gravel	119-121
	28	Clay, gray, silty, gravelly (till)	121-149
	35	Gravel, medium to fine	149-184
	30	Clay, gray, silty, gravelly (till)	184-214
		Quartzite	214
		Total Depth - 214 feet	

101-55-22bccc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼NW¼ Section: 22 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-52-77 Land Owner:

County: McCook Date: August 19, 1977 Elevation: 1449 (~~XX~~, ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	20	Clay, yellow-brown, silty, pebbly (till)	1- 21
	30	Clay, grya, silty, pebbly (till)	21- 51
	22	Clay, gray, silty, gravelly (till)	51- 73
	1	Gravel	73- 74
	6	Clay, gray, silty, gravelly (till)	74- 80
	35	Clay, gray, gravelly, gravel stringers (till)	80-115
	32	Clay, grayvelly, silty (till)	115-147
	31	Gravel, fine to medium (very little gravel in samples)	147-178
	16	Clay, gray, very silty (lake deposit (?))	178-194
	24	Clay, gray, silty, gravelly (till)	194-218
	8	Clay, gray, silty, gravelly, rocks (till)	218-226
	9	Gravel, medium to coarse	226-235
		Quartzite (?)	235
		Total Depth - 235 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-53-77 Land Owner: _____

County: McCook Date: July 19, 1977 Elevation: 1443 (~~AX~~ X, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	3	Clay, yellow-brown, silty, sandy (till)	2- 5
	18	Clay, brown, silty, sandy, pebbly (till)	5- 23
	55	Clay, gray, silty, sandy, pebbly (till) (gravel from	
		71-74)	23- 78
	64	Clay, gray, sandy, silty, pebbly (till)	78-142
	27	Gravel, fine to medium and sand, medium to coarse,	
		silty	142-169
	9	Silt and clay (lake deposit)	169-178
	20	Clay, gray, silty, sandy, pebbly (till)	178-198
		Quartzite	198
		Total Depth - 198 feet	

101-55-28bcbc

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼SW¼NW¼ Section: 28 T. 101 N. ~~S~~ R. 55 ~~E~~. W.

Well: _____ Test Hole: R-54-77 Land Owner: _____

County: McCook Date: August 22, 1977 Elevation: 1439 (~~XX~~ ~~X~~, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black, silty	0- 1
	3	Clay, yellow-brown, silty (till)	1- 4
	21	Clay, grown, silty, sandy, pebbly (till)	4- 25
	36	Clay, gray, silty, sandy, pebbly (till)	25- 61
	27	Sand, coarse and gravel, fine, interbedded layers of	
		silt	61- 88
	50	Clay, gray, sandy, silty, pebbly (till)	88-138
	28	Gravel, fine to medium with layers of sand, silt and	
		clay	138-166
	12	Clay, gray, silty, sandy, pebbly (till)	166-178
	14	Gravel, medium to coarse, silty	178-192
	12	Clay, gray, silty, sandy, gravelly (till (?))	192-204
		Quartzite (?)	204
		Total Depth - 204 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NW¼NE¼NE¼ Section: 33 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-55-77 Land Owner: _____

County: McCook Date: August 19, 1977 Elevation: 1439 (~~M.~~ ~~L.~~ T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	3	Clay, brown, silty, sandy (till)	2- 5
	13	Clay, brown, silty, sandy, pebbly (till)	5- 18
	50	Clay, gray, silty, sandy, pebbly (gravel from 61' to	
		63') (till)	18- 68
	7	Gravel, fine to medium	68- 75
	6	Clay, gray, silty, sandy, gravel stringers (till)	75- 81
	13	Gravel, fine to medium, silty	81- 94
	42	Clay, gray, silty, sandy, gravelly (till)	94-136
	26	Gravel, fine to medium, silty	136-162
	9	Clay and silt	162-171
	25	Clay, gray, silty, sandy, pebbly (till)	171-196
		Quartzite (?)	196
		Total Depth - 196 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NW¼SW¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-56-77 Land Owner:

County: McCook Date: August 22, 1977 Elevation: 1435 (~~XX~~, ~~X~~, T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, dark-brown, silty	0- 2
	3	Clay, yellow-brown, silty (till (?))	2- 5
	13	Clay, brown, silty, sandy, pebbly (till)	5- 18
	41	Clay, gray, silty, sandy, pebbly (till)	18- 59
	28	Gravel, fine to medium, layers of clay and silt	
		(lake deposits)	59- 87
	59	Clay, gray, silty, sandy, pebbly (till)	87-146
	20	Gravel, fine to medium with sand, clay and silt layers	146-166
	34	Clay, sandy, silty, pebbly (till (?))	166-200
		Quartzite (?)	200
		Total Depth - 200 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼NW¼SW¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: _____ Test Hole: R-57-77 Land Owner: _____

County: McCook Date: August 22, 1977 Elevation: 1435 (~~X~~, X, T)

E-Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	25	Clay, yellow-brown, silty, pebbly (till)	1- 26
	28	Clay, gray, silty, pebbly (till)	26- 54
	1	Gravel	54- 55
	88	Clay, gray, silty, gravelly (till)	55-143
	19	Gravel, fine to medium, silty	143-162
	6	Silt, (lake deposit (?))	162-168
	17	Clay, gray, silty, gravelly (till)	168-185
		Total Depth - 185 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼SW¼NE¼ Section: 28 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-58-77 Land Owner:

County: McCook Date: August 22, 1977 Elevation: 1440 (~~FT.~~ T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	22	Clay, yellow-brown, silty, pebbly (till)	2- 24
	30	Clay, gray, silty, pebbly (till)	24- 54
	2	Gravel	54- 56
	70	Clay, gray, gravelly, silty (till)	56-126
	6	Gravel, medium to coarse	126-132
	10	Clay, gray, sandy, gravelly with gravel stringers	
		(till (?))	132-142
	37	Gravel, fine to medium, cemented	142-179
	4	Clay, gray (silt (?))	179-183
	32	Clay, gray, sandy, gravelly (till)	183-215
		Total Depth - 215 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NW¼NE¼ Section: 28 T. 101 N. ~~XX~~ R. 55 ~~XX~~ W.

Well: Test Hole: R-59-77 Land Owner:

County: McCook Date: August 24, 1977 Elevation: 1440 (~~XX~~, ~~X~~ T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0- 1
	21	Clay, yellow-brown, silty, pebbly (till)	1- 22
	110	Clay, gray, silty, pebbly (till)	22-132
	32	Gravel, fine to medium	132-164
	5	Clay, silt (lake deposit?)	164-169
	31	Clay, gray, silty, gravelly (till)	169-200
		Total Depth - 200 feet	

101-55-27aabb

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NE¼NE¼ Section: 27 T. 101 N. ~~S.~~ R. 55 ~~E.~~ W.

Well: Test Hole: R-60-77 Land Owner:

County: McCook Date: August 24, 1977 Elevation: 1450 (~~AA~~ ~~X~~ T)

E Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0- 2
	15	Clay, yellow-brown, silty, pebbly (till)	2- 17
	35	Clay, gray, silty, pebbly (till)	17- 52
	17	Clay, gray, silty, gravelly (till)	52- 69
	9	Clay, gray, silty, pebbly (till)	69- 78
	1	Gravel	78- 79
	3	Clay, gray, silty, pebbly (till)	79- 82
	12	Gravel, clayey	82- 94
	70	Clay, gray, silty, gravelly (till)	94-164
	30	Gravel, medium to coarse	164-194
	64	Clay, gray, silty, gravelly (till)	194-258
		Quartzite	258
		Total Depth - 258 feet	
		Observation Well (S.D.G.S.) length of pipe 168? feet	
		Water Quality - 2000 ppm TDS	

101-55-27baaa

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NW¼ Section: 27 T. 101 N. ~~S~~ R. 55 ~~E~~ W.

Well: Test Hole: R-61-77 Land Owner:

County: McCook Date: August 25, 1977 Elevation: 1450 (~~X~~ X T)

E-Log: Samples: Drilling Company: S.D.G.S.

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black, silty	0- 1
	3	Clay, brown, silty, sandy	1- 4
	22	Clay, brown, silty, sandy, pebbly (till)	4- 26
	18	Clay, gray, silty, sandy, pebbly (till)	26- 44
	114	Clay, gray, sandy, silty, pebbly (fine gravel from	
		72' to 74') (till)	44-158
	48	Gravel, medium to coarse, well sorted, clean	158-206
	32	Clay, gray, silty, sandy, pebbly (till)	206-238
		Quartzite	238
		Total Depth - 238 feet	

101-55-34abbb

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NE¼ Section: 34 T. 101 N. ~~S.~~ R. 55 ~~XX~~ W.

Well: _____ Test Hole: R-62-77 Land Owner: _____

County: McCook Date: August 25, 1977 Elevation: 1446 (~~XX~~ X, T)

E Log: _____ Samples: _____ Drilling Company: S.D.G.S.

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil, black	0- 3
	6	Clay, yellow-brown, silty, pebbly (till)	3- 9
	101	Clay, gray, silty, pebbly (till)	9-110
	32	Clay, gray, silty, gravelly with gravel stringers	110-142
	12	Gravel, medium to fine	142-154
	18	Clay, gray, silty (lake deposit (?))	154-172
	28	Clay, gray, silty, gravelly (till)	172-200
		Total Depth - 200 feet	