STATE OF SOUTH DAKOTA
Richard Kneip, Governor

DEPARTMENT OF WATER AND NATURAL RESOURCES
Vern W. Butler, Secretary

GEOLOGICAL SURVEY
Duncan J. McGregor, State Geologist

Open-File Report No. 9-UR

GROUND-WATER STUDY FOR THE CITY OF MILBANK

by

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GROUND-WATER STUDY FOR THE CITY OF MILBANK

At the request of the City of Milbank, the South Dakota Geological Survey conducted a ground water study in and around the City of Milbank. The field work was conducted during the summers of 1974 and 1975.

The purpose of this study was to assist the city in locating a future water supply. The results of this study indicate that there are two potential water sources for the City.

1. Twin Brooks Area. This area is located approximately seven miles west of Milbank. The City is pumping water from 3 wells and springs in this area. Table 1 shows the results of analysis of water samples collected in the Milbank area. Samples W-11, W-12, W-13 were collected from City wells No. 1, 2, and 3 respectively. These samples have an average of 1372 parts per million total solids, 537 ppm sulfate, and 569 ppm hardness. The iron content of these waters are over the limits recommended by the South Dakota Department of Health. Sample W-14 was collected from a spring used by the City. This water has 532 ppm total solids, 164 ppm sulfate, and 442 ppm hardness. There is very limited data on the water levels and pumping rates of the City wells. Wells No. 1 and No. 2 do not have operational water level gauges and the accuracy of the lengths of air line in Well No. 3 is questionable. Because of a flowing water zone in this area, the Geological Survey did not drill any test holes. Based on the available data from the City files,

J. T. Banner and Associates, Inc., and the well drillers, it is concluded that the area probably could sustain additional well(s).

If the City should decide to test this area and develop additional wells, it is recommended that a pump test be conducted in the area and more accurate water level and pumping rate records should be kept for future reference.

2. Northeast of Milbank. The results of the test hole drilling in this area indicate there is an outwash deposit in and around Section 20, Township 121 North, Range 47 West (approximately one mile east and three miles north of the city which may contain enough water for a city supply). For location of test holes see figure 1 and for logs see Appendix A, B. and C. Water samples W-1 and W-2 in table 1 were collected from North Fork Whetstone River. For the location of water samples see figure 2. These samples have approximately 1100 ppm total solids, 500 ppm sulfates, and 690 ppm hardness.

Samples W-4, W-5 were collected from ground water in Section 10 and W-8, W-9 were collected from Section 29 south of Section 20. These 4 samples have an average of 573 ppm hardness, 288 ppm sulfate, and 791 ppm total solids. From all the samples collected in the area, samples W-4 and W-6 have higher nitrate than the recommended limits set by the State of South Dakota. The most promising locations for development of a new

water source is northeast of Milbank in the vicinity of test holes A-15, B-8, and B-18 in Section 20.

If the City should decide to test this area, it is recommended that a pump test be conducted and water samples collected and analyzed. This pump test and water analysis will help to determine the quantity and quality of water.

Before a permanent well is drilled, the City officials should contact the Division of Water Rights, Department of Natural Resource Development, Pierre, South Dakota, to obtain water rights and a permit to drill a municipal well. The Department of Environmental Protection should also be contacted for assistance in determining the biological and chemical suitability of the water.

This report was prepared by Assad Barari, June 1976.

Table 1. CHEMICAL ANALYSES OF WATER SAMPLES FROM THE MILBANK AREA

Sample	Source	Parts Per Million										
		Calcium	Sodium	Magnesium	Chlorides	Sulfate	Iron	Manganese	Nitrate	Flouride	Hardness $CaCO_3$	Total Solids
A		--	--	--	250	500[1]	0.3	0.05	10.0	0.9-1.7[2]	--	1000
W-1	R	130	50	90	20	600	0.7	0.6	5		690	1208
W-2	R	130	30	90	14	500	0.7	0.2	2.6		690	1004
W-3	G	160	20	60	10	265	0.1	0.2	0.5		650	820
W-4	G	96	15	62	14	146			17	0.25	490	682
W-5	G	255	150	50	25	500	2.0	0.15	0.5		850	1190
W-6	G	170	20	95	94	430	0.5	0.1	>14		813	1324
W-7	G	160	40	84	3	659		0.0	2	0.4	735	1202
W-8	G	53	15	46	18	168			6.0	0.2	312	468
W-9	G	130	20	76	16	340	1.5	0.2	1.0		640	824
W-10	G	128	10	26		142	0.1	0.0	1.0	0.25	422	672
W-11	G	124	240	58	49	667	1.4		4.	0.25	542	1452
W-12	G	126	230		29	365	1.2		3.		532	1374
W-13	G	256	144		13	580	1.9		3.	0.25	635	1290
W-14	S	11	10	104		164			1.		442	532

A - Drinking water standards, U.S. Public Health Service (1962)

1 - Modified for South Dakota by the Department of Health (written communication, Water Sanitation Section, September 24, 1968)

2- 1.2 is optimum for South Dakota

Source - R - river; G - ground water; S - spring.

Samples W-1, W-2, W-3, W-5, W-6 and W-9 were analyzed by the South Dakota Geological Survey. The remaining samples were analyzed by the State Chemical Laboratory.

Location of Water Samples

(for map location see Figure 2)

W-1 SE¼SE¼SE¼SE¼ Sec 18 T121N R47W, North Fork Whetstone River.

W-2 SE¼NE¼NE¼SE¼ Sec 20 T121N R47W, North Fork Whetstone River.

W-3 NW¼NW¼NW¼NW¼ Sec 19 T121N R47W, W. Grove, 60 feet deep, water level 40? feet.

W-4 NW¼NW¼ Sec 20 T121N R47W D. E. Trapp, 34 feet deep.

W-5 SW¼SW¼SW¼SW¼ Sec 20 T121N R47W, Test hole A16.

W-6 NE¼SW¼NE¼NW¼ Sec 21 T121N R47W, L. Fryer, 50 feet deep, water level 32 feet.

W-7 SE¼SE¼SE¼NE¼ Sec 25 T121N R48W, H. Peters, 28 feet deep.

W-8 SW¼SW¼SW¼NW¼ Sec 29, T121N R47W, T. Dinter, tenant, 30 feet deep.

W-9 SE¼NW¼SE¼NE¼ Sec 29 T121N R47W, P. Tuchscherer, 86 feet deep, water level, 51 feet.

W-10 SE¼SW¼SE¼SE¼ Sec 4 T120N R48W, D. Schultz, 160 feet deep, water level, 100? feet.

W-11 Milbank City Well No. 1, in the Twin Brooks area, 260 feet deep, water level 70? feet

W-12 Milbank City Well No. 2, in the Twin Brooks area, 260 feet deep, water level 70? feet.

W-13 Milbank City Well No. 3, in the Twin Brooks area, 260 feet deep, water level 60? feet.

W-14 Spring water, used by the City of Milbank, in the Twin Brooks area.

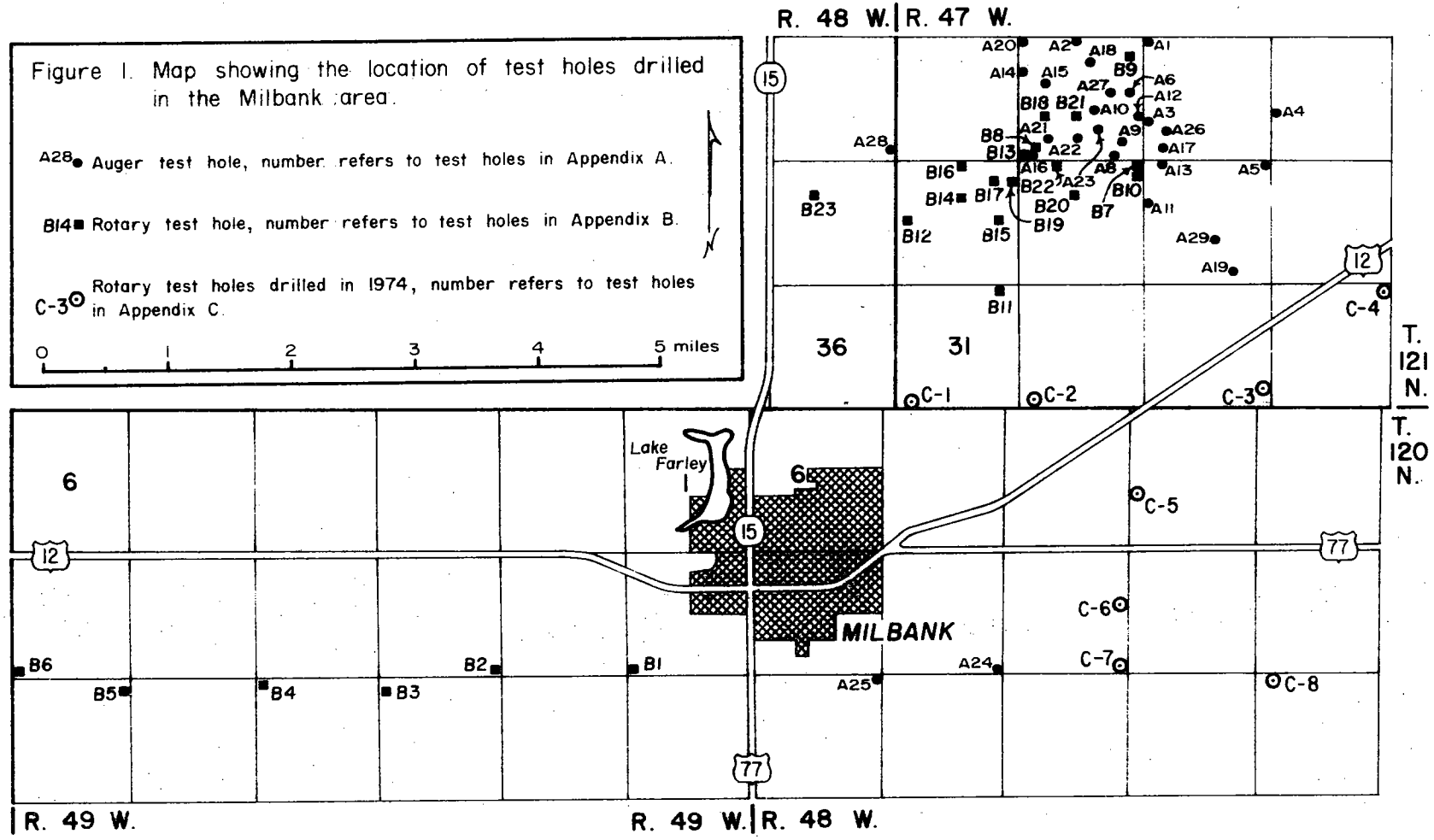
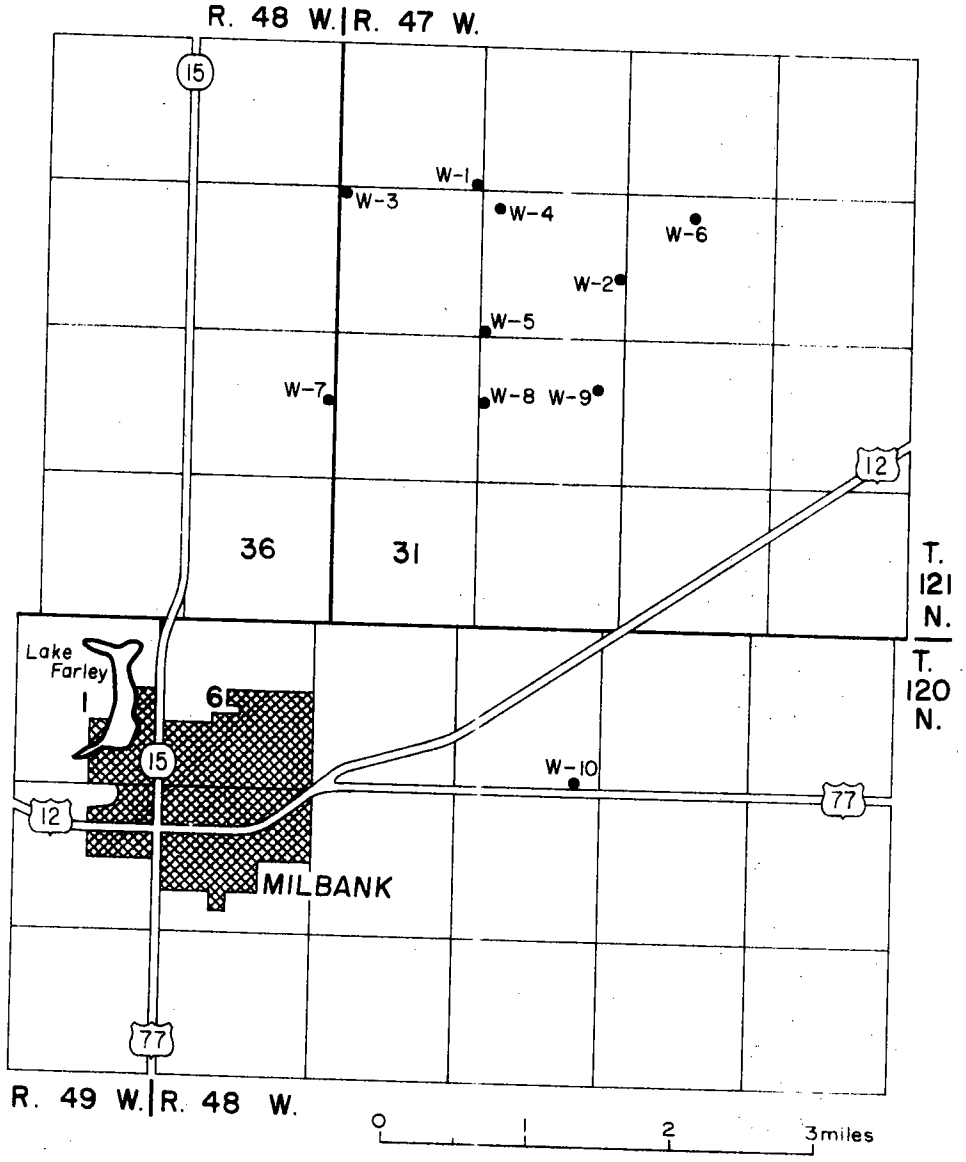


Figure 1. Map showing the location of test holes drilled in the Milbank area.



W-7● Water sample No. 7, (samples W-11 through W-14 are in the Twin Brooks area and are not included on this map).

Figure 2. Map showing the location of water samples collected in the Milbank area.

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NW¼ Section: 21 T. 121 N. S. R. 47 W. W.

Well: no Test Hole: A-1 Land Owner: Duane Trapp

County: Grant Date 7-8-75 Elevation: 1060 (T)

E-Log: no Samples: yes Drilling Company: Sdgs Auger

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, black, clayey, moist	0-3
	2	Clay, dark gray, silty, partly,sandy, moist	3-5
	1	Clay, gray, sandy, moist	5-6
	2	Sand, gray, slightly clayey; some coarse gravel,	
		saturated	6-8
	8	Sand, brown, medium-coarse, slightly clayey,	
		some coarse gravel	8-16
	8	Gravel, coarse	16-24
	7	Gravel, with brown clay, sandy	24-31
	3	Clay, black, silty, with some coarse gravel	31-34
	4	Clay, black, silty	34-38
	9	Sand, gray, medium, clayey	38-47
	12	Clay, gray, sandy	47-59
		Pulled out because clay was too sticky	
		T.D. - 59 feet	
		W.T. - 5 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NW¼ Section: 20 T. 121 N. R. 47 W.

Well: non Test Hole: A-2 Land Owner:

County: Grant Date 7-9-75 Elevation: 1055 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave La France

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, black, clayey, moist	0-3
	2	Gravel, coarse	3-5
	12	Sand, gray, medium, with some coarse gravel,	
		saturated	5-17
	3	Sand, gray, medium, very clayey	17-20
	2	Clay, brown, silty	20-22
	18	Sand, gray, medium, very clayey	22-40
	12	Gravel, coarse	40-52
	17	Clay, gray, some coarse sand and fine gravel	52-69
		Had to pull out at 69, the till was too	
		sticky	
		T.D. - 69 feet	
		W.T. - 5 feet	

121 47 21 cbcb

SOUTH DAKOTA GEOLOGICAL SURVEY

Location ~~NW¼SW¼NW¼SW¼~~ Section: 21 T. 121 N. S R. 47 E. W.

Well: no Test Hole: A3 Land Owner:

County: Grant Date 7-10-75 Elevation: 1050 XXXX(A,T)

E-Log: ~~no~~ Samples: yes Drilling Company: sdgs

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, dark brown, moist	0-3
	4	Silt, dark brown, clayey, moist	3-7
	3	Clay, dark brown, silty, moist	7-10
	1	Clay, gray-brown, silty, moist	10-11
	2	Clay, black, silty, moist	11-13
	2	Clay, dark gray, silty, saturated	13-15
	21	Sand, dark gray, fine, very clayey, saturated	15-36
	24	Clay, gray, very fine sand and coarse silt,	
		saturated, very soft	36-60
	15	Clay, gray, with medium sand, saturated	60-75
	24	Clay, gray, with coarse sand & fine gravel	75-97
		T.D. - 99 feet	
		W.T. - 13 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼SW¼NW¼SW¼ Section: 22 T. 121 N. ~~X~~ R. 47 ~~E~~ W.

Well: No Test Hole: A4 Land Owner:

County: Grant Date 7-10-75 Elevation: 1048 ~~X(A,T)~~

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Silt, light brown, dry	0-2
	5	Clay, dark brown, silty, dry	2-7
	2	Clay, dark brown, silty, moist	7-9
	3	Sand, dark gray, medium, clayey, saturated	9-12
	3	Sand, brown, fine to medium, slightly clayey	12-15
	1	Sand, brown, fine to medium, some coarse gravel	15-16
	3	Sand, light brown, very coarse; with some coarse	
		gravel, very slightly clayey	16-19
	2	Gravel, coarse	19-21
	22	Clay, gray, with some coarse sand (till)	21-43
	15	Silt, gray, very fine; with fine sand	43-58
		Rock	
		T.D. - 58 feet	
		W.T. - 9 feet	

Appendix A A-5

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 28 T. 121 N. S R. 47 E. W.

Well: no Test Hole: A-5 Land Owner:

County: Grant Date 7-10-75 Elevation: 1058 (G,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, brown, dry	0-3
	2	Silt, brown, moist	3-5
	1	Gravel, coarse, with orange brown clay	5-6
	4	Gravel, medium to coarse, with medium sand	
		and coarse orange brown silt, moist	6-10
	5	Sand, fine; with coarse orange brown silt	10-15
	4	Sand, fine; with coarse orange brown silt	15-19
		and some medium gravel, moist	
	2	Sand, brown, coarse; with fine gravel, moist	19-21
	9	Sand, orange brown, coarse, with fine gravel	
		and slightly clayey	21-30
	29	Clay, gray; with coarse sand and fine	
		gravel (till)	30-59
		T.D. - 59 feet	
		W.T. - 21 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SE¼SE¼NE¼ Section: 20 T. 121 N. R. 47 W.

Well: no Test Hole: A6 Land Owner:

County: Grant Date 7-11-75 Elevation: 1045 (S,L,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Silt, brown, clayey, moist	0-5
	2	Clay, brown, with medium sand and some fine	
		gravel, moist	5-7
	2	Sand, brown, medium to coarse, some fine	
		gravel clayey, saturated	7-9
	5	Sand, brown, medium to coarse, some fine	
		gravel, slightly clayey	9-14
	6	Sand, gray brown, medium to coarse, some fine	
		gravel, clayey	14-20
	5	Clay, gray, silty, with fine sand, soft	20-25
	21	Sand, brown, medium to coarse, clayey	25-46
	5	Gravel, coarse	46-51
	18	Sand, brown, medium to coarse, clean, with	
		some medium gravel	51-69
	5	Clay, gray with coarse sand and fine gravel	
		(till)	69-74
		T.D. - 74 feet	
		W.T. - 7 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼SE¼SE¼ Section: 20 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: A8 Land Owner:

County: Grant Date 7-11-75 Elevation: 1060 (A,I,T)

E-Log: no Samples: ye s Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Silt, dark brown, dry	0-1
	2	Clay, dark brown, silty, moist, soft	1-3
	3	Clay, brown, silty, moist, soft	3-6
	3	Clay, dark gray, silty, some fine sand,	
		saturated	6-9
	3	Clay, dark gray, silty, some fine sand and	
		fine gravel	9-12
	3	Sand, brown, fine to medium, clayey	1215
	5	Sand, brown, fine to coarse, clayey; with	
		small gravel	15-20
	22	Gravel, fine and sand, very coarse, salt	
		and pepper colored, clean	20-42
	22	Clay, gray, with coarse sand and fine gravel	
		(till)	42-64

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼SE¼SE¼ Section: 20 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: A9 Land Owner:

County: Grant Date 7-12-75 Elevation: 1055 (A,I,T)

E-Log: no Samples: y es Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil	0-2
	3	Clay, dark brown, silty moist, soft	2-5
	4	Clay, gray brown, sandy, moist	5-9
	5	Sand, brown, coarse, clayey, saturated	9-14
	3	Sand, brown, coarse, with fine gravel	14-17
	7	Gravel, fine, clean	17-24
	1	Gravel, fine, with coarse sand	24-25
	16	Sand, gray-brown, fine to coarse, clean	25-41
	9	Clay, gray, silty, fairly soft	41-50
	42	Clay, gray, pebbly (till)	50-92
		T.D. - 92 feet	
		W.T. - 9 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NW¼NW¼SE¼ Section: 20 T. 121 N. R. 47 W.

Well: no Test Hole: A10 Land Owner:

County: Grant Date 7-12-75 Elevation: 1080 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Topsoil, clay, black	0-5
	2	Sand, dark brown-gray, coarse, clayey, saturated	5-7
	3	Sand, dark brown, coarse, clayey	7-10
	5	Sand, gray brown, coarse, clayey; with some	
		fine gravel	10-15
	9	Sand, gray brown, coarse, with some fine	
		gravel; clean	15-24
	21	Sand, brown, coarse, slightly clayey; with	
		some fine gravel	24-45
	9	Sand, gray, coarse, clayey, with some fine	
		gravel	45-54
	9	Silt, gray, some coarse sand, very clayey	54-63
	7	Gravel, coarse	63-70
	28	Clay, gray, pebbly; hard (till)	70-98
		T.D. - 98 feet	
		W.T. - 7 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼SW¼NW¼ Section: 28 T. 121 N. ~~S~~ R. 47 E. ~~W~~.

Well: no Test Hole: A11 Land Owner:

County: Grant Date 7-14-75 Elevation: 1070 (~~A~~,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Sand, tan, fine to coarse, silty, dry	0-5
	8	Sand, tan, coarse, with fine gravel, silty,	
		moist	5-13
	7	Sand, orange-brown, coarse, with fine gravel,	
		silty, saturated	13-20
	17	Gravel, fine to coarse, with some medium sand,	
		saturated	20-37
	61	Sand, fine to coarse, some fine gravel	37-98
	11	Clay, gray-brown, silty	98-109
		T.D. - 109 feet	
		W.T. - 7 feet	

Appendix A A-12

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼NE¼SE¼ Section: 20 T. 121 N. R. 47 W.

Well: no Test Hole: A12 Land Owner:

County: Grant Date 7-14-75 Elevation: 1070 (T)

E-Log: no - Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Sand, gray-brown, medium to coarse, some clay	
		dry	0-4
	9	Sand, tan, medium to coarse, silty, moist	4-13
	3	Rocks	13-16
		T.D. - 16 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NE¼NW¼NW¼ Section: 28 T. 121 N. XX R. 47 E. XX.

Well: no Test Hole: A13 Land Owner:

County: Grant Date 7-15-75 Elevation: 1050 (XX,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Clay, gray-brown, silty, dry	0-3
	6	Clay, tan, sandy, with some fine gravel	3-9
	7	Clay, gray-brown, sandy	9-16
	16	Clay, gray, silty, some sand & gravel (till)	16-32
	24	Clay, gray, sandy	32-56
	6	Sand, fine to coarse, some medium gravel	56-62
		Rock	
		T.D. - 62 feet	
		W.T. - 4 feet	

Appendix A A-14

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼SW¼NW¼ Section: 20 T. 121 N. S~~X~~ R. 47 E. ~~W~~.

Well: no Test Hole: A-14 Land Owner:

County: Grant Date 7-15-75 Elevation: 1080 (~~A~~,~~I~~,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Clay, tan, sandy, dry	0-1
	4	Sand, tan, medium with medium gravel,	
		clayey, dry	1-5
	7	Gravel, medium to coarse, silty, dry	5-12
	14	Gravel, tan, fine to medium, very clayey, dry	12-26
	5	Sand, tan, coarse, with fine gravel, very	
		clayey, saturated	26-31
	68	Sand, blue, very fine	31-97
		T.D. - 99 feet	
		W.T. - 20 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼SW¼NW¼ Section: 20 T. 121 N. S R. 47 E. W.

Well: no Test Hole: A15 Land Owner:

County: Grant Date 7-16-75 Elevation: 1170 (A,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Clay, gray-brown, silty, dry (topsoil)	0-1
	3	Gravel, coarse, very clayey, some sand	1-4
	3	Sand, tan, medium, with fine gravel, very	
		clayey, dry	4-7
	7	Clay, tan, very gravelly, dry	7-14
	3	Gravel, medium to very coarse, dry	14-17
	50	Sand, medium with medium gravel	17-67
	22	Clay, gray, silty	67-89
		T.D. - 89 feet	
		W.T. - 17 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼SW¼SW¼ Section: 20 T. 121 N. ~~X~~ R. 47 ~~X~~E. W.

Well: no Test Hole: A16 Land Owner:

County: Grant Date 7-16-75 Elevation: 1065 ~~XXXX~~(A,I,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Clay, gray, silty, moist	0-2
	7	Clay, brown-gray, silty, some sand, moist	2-9
	16	Sand, light gray, fine, clayey, saturated	9-25
	84	Sand, light gray, fine, clean, saturated	25-109
		Quit due to strain on Kelly hub	
		T.D. 109 Feet	
		W.T. 4 Feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼SE¼SW¼SW¼ Section: 21 T. 121 N. S R. 47 E. W.

Well: no Test Hole: A17 Land Owner:

County: Grant Date 7-17-75 Elevation: 1060 (G,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Clay, gray, silty, some sand, dry (topsoil)	0-2
	3	Clay, dark gray, silty, moist	2-5
	9	Clay, gray to tan, silty, moist	5-14
	10	Clay, tan, silty, with fine gravel, moist	14-24
	8	Gravel, fine to coarse, some coarse sand, clean	24-32
	20	Clay, blue-gray, silty	32-52
	17	Clay, drk gray, sandy, silty	52-69
		T.D. - 69 feet	
		W.T. 19 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼NW¼NE¼ Section: 20 T. 121 N. ~~S.~~ R. 47 ~~E.~~ W.

Well: no Test Hole: A18 Land Owner:

County: Grant Date 7-17-75 Elevation: 1055 ~~(A,T)~~

E-Log: ~~no~~ Samples: ~~yes~~ Drilling Company: ~~SDGS~~

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Clay, dark gray, silty, moist (topsoil)	0-5
	42	Clay, dark gray, sandy, saturated	5-47
	16	Sand, medium to fine gravel, some clay	47-63
	2	Clay, blue-gray, silty, very tight drilling	63-65
		T.D. - 65 feet	
		W.T. - 4 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SW¼SE¼ Section: 28 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: A19 Land Owner:

County: Grant Date 7-28-75 Elevation: 1060 (A,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, dark gray, dry, (topsoil)	0-3
	4	Silt, gray, some sand, dry	3-7
	4	Silt, gray, some medium sand and fine gravel, dry	7-11
	11	Sand, gray-brown, coarse to very coarse, clayey	11-22
		saturated	
	51	Clay, gray, silty,	22-73
	9	Sand, gray, medium-coarse, very clayey	73-82
	17	Clay, gray, sandy	82-99
		T.D. - 99 feet	
		W.T. - 11 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NW¼ Section: 20 T. 121 N. R. 47 E. W.

Well: no Test Hole: A20 Land Owner:

County: Grant Date 7-28-75 Elevation: 1070 (G,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Silt, black, moist (topsoil)	0-2
	7	Clay, brown, with sand and gravel, saturated	2-9
	13	Clay, brown, sandy	9-22
	3	Sand, brown, medium to coarse, very clayey	22-25
	29	Clay, gray, silty, with many pebbles (till)	25-54
		T.D. - 54 feet	
		W.T. - 3 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼SW¼SW¼ Section: 20 T. 121 N. S R. 47 E. W.

Well: no Test Hole: A21 Land Owner:

County: Grant Date 7-29-75 Elevation: 1060 (A,I,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	11	Silt, dark brown, very sandy, moist	0-11
	11	Sand, tan, fine to medium, saturated	11-22
	82	Sand, tan, very fine to fine	22-104
		T.D. - 104 feet	
		W.T. - 2 feet	

Appendix A A-22

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼SE¼SW¼ Section: 20 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: A22 Land Owner:

County: Grant Date 7-31-75 Elevation: 1060 (T)

E-Log: no Samples: ye s Drilling Company: SDGS

Source of Data: Phil Olsen

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, dark brown, dry	0-3
	10	Silt, black, moist	3-13-
	10	Clay, dark gray, some fine sand & gravel (till)	13-23
	56	Clay, gray, silty, pebbly (till)	23-79
		T.D. - 79 feet	
		W.T. - 6 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NE¼SW¼SE¼ Section: 20 T. 121 N. R. 47 E. W.

Well: no Test Hole: A23 Land Owner:

County: Grant Date 8-4-75 Elevation: 1065 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Silt, gray-brown, dry	0-3
	2	Silt, gray-brown, with coarse gravel, dry	3-5
	2	Sand, gray-brown, medium; silty with some	
		medium gravel; slightly moist	5-7
	3	Sand, light brown, medium to coarse, slightly	
		moist	7-10
	9	Sand, brown, very coarse, pebbly, clayey,	
		saturated	10-19
	17	Sand, brown, very coarse, with some fine	
		gravel, clean	19-36
	7	Clay, gray, silty, soft	36-43
	15	Till, gray, hard	43-58
		T.D. - 58 feet	
		W.T. - 10 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 8 T. 120 N. ~~S.~~ R. 48 ~~E.~~ W.

Well: no Test Hole: A24 Land Owner:

County: Grant Date 8-4-75 Elevation: 1196 (~~G~~,T)

E-Log: ~~no~~ Samples: ~~yes~~ Drilling Company: SDGs

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Silt, dark brown, clayey, dry	0-4
	6	Clay, brown, silty, with some medium to	
		coarse sand, moist	4-10
	8	Clay, dark brown, silty, with some medium to	
		coarse sand, moist	10-18
	2	Clay, dark brown, silty, with some medium	
		to coarse sand, saturated	18-20
	4	Clay, brown, silty	20-24
	4	Clay, gray, some sand (till)	24-28
	2	Clay, brown, very sandy	28-30
	9	Clay, gray, some sand (till)	30-39
	3	Clay, brown, very sandy	39-42
	19	Clay, gray, some sand (till)	42-61
		T.D. - 61 feet	
		W.T. - 18 feet	

Appendix A A-25

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 18 T. 120 N. XX R. 48 XE. W.

Well: no Test Hole: A25 Land Owner:

County: Grant Date 8-4-75 Elevation: 1216 (XX,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave La France

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Clay, dark brown, silty, moist	0-2
	8	Clay, brown, sandy, moist	2-10
	14	Clay, brown, silty, some sand	10-24
	6	Clay, gray-brown, silty, some sand	24-30
	29	Clay, dark gray, silty, very little sand	30-59
		T.D. - 59 feet	
		W.T. - 50 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SE¼NW¼SE¼ Section: 21 T. 121 N R. 47 W.

Well: no Test Hole: A26 Land Owner:

County: Grant Date 8-4-75 Elevation: 1055 (A,E,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Silt, brown, dry	0-4
	8	Clay, dark brown, silty, moist	4-12
	8	Silt, gray, very clayey, some fine sand,	
		saturated	12-20
	7	Silt, gray, very clayey, with coarse sand	20-27
	32	Till, gray, pebbly, hard	27-59
		T.D. - 59 feet	
		W.T. - 12 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼SW¼SE¼NE¼ Section: 20 T. 121 N. R. 47 W.

Well: no Test Hole: A27 Land Owner:

County: Grant Date 8-5-75 Elevation: 1052 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	4	Silt, brown, dry	0-4
	3	Sand, dark brown, medium, clayey	4-7
	1	Sand, brown, coarse with fine gravel, clayey	7-8
	7	Sand, brown, coarse, with fine gravel, clean	8-15
	27	Sand, brown, medium to very coarse, clean	15-42
	8	Sand, brown, medium to very coarse, with	
		coarse gravel, clean	42-50
	4	Gravel, coarse	50-54
	1	Cobbles, medium, with some gray clay	54-55
		T.D. - 55 feet	
		W.T. - 6 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼SE¼SE¼ Section: 24 T. 121 N. ~~X~~ R. 48 ~~X~~ E. W.

Well: no Test Hole: A28 Land Owner:

County: Grant Date 8-15-75 Elevation: 1125 (~~X~~,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Silt, dark brown, dry	0-2
	2	Silt, light brown, clayey, slightly moist	2-4
	4	Clay, brown, silty, moist	4-8
	4	Clay, brown, silty with some medium sand,	
		moist	8-12
	3	Sand, light brown, medium to coarse, clayey	12-15
	28	Clay, gray, silty, some fine sand	15-43
	12	Sand, very coarse to fine gravel, slightly clayey	43-55
	14	Till, gray, sandy, clayey	55-69
		T.D. - 69 feet	
		W.T. - 12 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NW¼NW¼SE¼ Section: 28 T. 121 N. R. 47 W.

Well: no Test Hole: A29 Land Owner:

County: Grant Date 8-5-75 Elevation: 1055 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Dave LaFrance

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	5	Silt, dark brown, dry	0-5
	5	Sand, dark brown, coarse, with medium gravel	5-10
	5	Sand, gray, coarse, clayey	10-15
	5	Sand, gray, medium, clayey	15-20
	6	Sand, gray, coarse, clayey	20-26
	6	Sand, gray, very coarse, slightly clayey	26-32
	8	Sand, brown, very coarse, clean	32-40
	15	Sand, brown, very coarse with fine gravel, clean	40-55
	24	Till, gray, sandy, clayey	55-79
		T.D. - 79 feet	
		W.T. - 7 feet	

Appendix B B-1

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SW¼ Section: 12 T. 120 N. S. R. 49 E. W.

Well: no Test Hole: B-1 Land Owner: in ditch

County: Grant Date 7-24-75 Elevation: 1156 (X,T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil	0-2
	1	Gravel, medium, subrounded	2-3
	5	Clay, gray to tan	3-8
	6	Clay, gray, with medium sand (till)	8-14
	1	Gravel, medium, rounded	14-15
	45	Till, unoxidized, interbedded with 6 to 12	
		inch layers of gravel	15-60
	16	Till, gray, gravelly, pebbly, clayey	60-76
	44	Shale, dark gray, greasy	76-120
		T.D. 120 feet	

120 49 10 dddd

Appendix B B2

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 10 T. 120 N.XX. R. 49 XX W.

Well: no Test Hole: B2 Land Owner:

County: Grant Date 7-24-75 Elevation: 1166 X(X)(X)(T)

E-Log: no Samples: yes Drilling Company:

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	5	Clay, brown, slightly silty, very soft	2-7
	11	Gravel, fine to medium, subrounded to rounded	7-18
	40	Till, gray, interbedded with 1 to 2 foot thick	
		layers of gravel	18-58
	31	Gravel, medium coarse, subrounded, with thin	
		layers-interbedded gray till	58-89
	21	Shale, dark gray, greasy	89-110
		TD 110 feet	

120 49 15 bbbc

Appendix B B3

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼NW¼NW¼ Section: 15 T. 120 N. ~~S.~~ R. 49 ~~E.~~ W.

Well: no Test Hole: B3 Land Owner:

County: Grant Date 7-25-75 Elevation: 1186 (~~G.L.~~, T)

E-Log: no Samples: yes Drilling Company:

Source of Data: Danzl and Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil	0-1
	28	Till, light brown, interbedded with 6 to 12	
		inch layers of gravel	1-29
	29	Till, gray, pebbly	29-58
	32	Till, gray, sandy, shaley	58-90
	30	Shale, gray, greasy, well fractured	90-120
		TD 120'	

Appendix B B4

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NW¼ Section: 16 T. 120 N R. 49 W.

Well: no Test Hole: B4 Land Owner:

County: Grant Date 7-24-75 Elevation: 1196 (T)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	10	Silt, light brown	2-12
	26	Till, light to dark brown	12-38
	8	Till, gray, gravelly, with medium and sub-	
		rounded sand	38-46
	24	Till, gray, clayey, sandy	46-70
	30	Shale, gray, greasy, well fractured	70-100
		TD 100'	

Appendix B B5

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼NE¼NE¼ Section: 18 T. 120 N. S. R. 49 W. W.

Well: no Test Hole: B5 Land Owner:

County: Grant Date 7-25-75 Elevation: 1216 (MSL)

E-Log: no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	28	Till, light brown, sandy, pebbly	2-30

120 49 7 cccc

Appendix B

B6

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SW¼ Section: 7 T. 120 N. ~~S~~. R. 49 ~~E~~. W.

Well: no Test Hole: B6 Land Owner:

County Grant Date 7-25-76 Elevation: 1234 ~~XXX~~ (A, I, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Wallace & Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	62	Till, light brown, sandy, clayey	2-64
	26	Till, gray, sandy, clayey, interbedded with	
		medium to fine gravel	64-90

Appendix B B7

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 29 T. 121 N.XX. R. 47 XX. W.

Well: no Test Hole: B7 Land Owner:

County Grant Date 7-31-75 Elevation: 1053 XXXX, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Gravel, dark brown, medium to coarse, rounded	0-1
	2	Clay, dark brown, sandy, soft	1-3
	6	Gravel, fine to medium and very coarse sub-	
		rounded sand	3-9
	6	Clay, brown to dark tan, silty, soft	9-15
	18	Gravel, medium to coarse, rounded	15-33
	3	Silt, black, very soft	33-36
	27	Clay, light brown, silty, somewhat sandy with	
		thin lenses of rounded medium gravel	36-63
	18	Sand, fine to coarse, subrounded	63-81
		Milbank granite	81
		TD 81 feet	

121 47 20 cccd

Appendix B B8

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼SW¼SW¼ Section: 20 T. 121 N. ~~X~~. R. 47 ~~X~~. W.

Well: no Test Hole: B8 , Land Owner:

County Grant Date 7-28-75 Elevation: 1060 ~~XXXX~~, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil	0-1
	3	Clay, dark gray to black, silty, soft	1-4
	38	Sand, medium to coarse, subrounded, with	
		medium to fine subrounded gravel	4-42
	18	Sand, medium to fine, subrounded	42-60
	30	Sand, medium to fine, interbedded with medium	
		gravel	60-90
	32	Sand, medium to fine, subrounded	90-122
	23	Sand, fine to medium, with some coarse, sub-	
		rounded, grades to fine gravel in lower 8 feet	122-145
	23	Gravel, coarse to very coarse	145-168
		Rock	168
		TD-168 feet	

Appendix B B9

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼SE¼NE¼NE¼ Section: 20 T. 121 N. XX R. 47 XX W.

Well: no Test Hole: B9 Land Owner:

County Grant Date 7-30-75 Elevation: 1065 XXXX (A, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, brown	0-1
	25	Gravel, coarse to very coarse, subrounded, clean	1-26
	5	Till, gray, gravelly	26-31
	57	Till, gray, sandy	31-88
	10	Sand, gray, fine to medium, very clayey, and shaley	88-98
	62	Till, gray, gravelly, shaley	98-160
	20	Shale, gray, greasy	160-180
		TD 180 feet	

Appendix B

B10

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 29 T. 121 N. XX R. 47 E. W.

Well: no Test Hole: B10 Land Owner:

County Grant Date B10 Elevation: 1053 (XXX, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0-1
	7	Sand, medium to coarse, subrounded to rounded	1-8
	3	Clay, light tan, slightly silty, soft	8-11
	4	Sand, medium to coarse, intermixed with fine	
		to medium gravel	11-15
	1	Gravel, coarse to very coarse, rounded	15-16
	1	Silt, black, soft	16-17
	1	Gravel, coarse to very coarse, rounded	17-18
	62	Sand, dark gray, medium to coarse grained,	
		silty, some shale chips	18-80
		Milbank granite	80
		TD 80 feet	

121 47 31 aaba

Appendix B B11

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NW¼NE¼NE¼ Section: 31 T. 121 N. ~~S~~. R. 47 ~~E~~. W.

Well: no Test Hole: B11 Land Owner: _____

County Grant Date 8-5-75 Elevation: _____ (A, I, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	8	Silt, gray, sandy	2-10
		Pulled up due to water loss	
		TD 10 feet	

Appendix B B12

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼NW¼ Section: 30 T. 121 N. XX R. 47 XX W.

Well: no Test Hole: B12 Land Owner:

County Grant Date 8-5-7 5 Elevation: 1105 XXXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black	0-2
	5	Clay, yellow-brown, silty	2-7
	16	Till, yellow-brown, clayey, sandy	7-23
	32	Sand, gray, fine to medium, subrounded, very	
		shaley	23-55
	21	Sand, gray, fine, with intermittent silty layers	55-76
	2	Gravel, medium, with some silty clay	76-78
	25	Till, gray, clayey, sandy	78-103
	12	Shale, reworked	103-115
Pierre	15	Shale, gray, greasy	115-130
		TD 130 feet	

121 47 20 cccc

Appendix B B13

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SW¼SW¼SW¼ Section: 20 T. 121 N. R. 47 W.

Well: no Test Hole: B13 Land Owner:

County Grant Date 8-20-75 Elevation: 1100 T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, black	0-1
	12	Sand, coarse, subrounded to subangular	1-13
	15	Gravel, fine to medium with coarse sand	13-28
	5	Sand, coarse, subrounded to subangular	28-33
	5	Gravel, fine to medium, some coarse	33-38
	6	Sand, coarse to very coarse, subangular	38-44
	2	Gravel, medium to coarse, rounded	44-46
	8	Sand, coarse to very coarse, subrounded	46-54
	24	Sand, fine to coarse, subrounded	54-78
	30	sand, fine to very fine gravel, rounded	78-108
	18	Gravel, fine to very coarse sand	108-126
	29	Gravel, medium to coarse	126-155
		Rock	155
		TD 155 feet	

121 47 30 acbb

Appendix B B14

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼SW¼NE¼ Section: 30 T. 121 N. R. 47 W.

Well: no Test Hole: B14 Land Owner:

County Grant Date 8-21-75 Elevation: 1088 (XXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil	0-1
	3	Clay, dark yellow to brown, silty	1-4
	12	Gravel, very coarse	4-16
	10	Gravel, medium to fine	16-26
	19	Gravel, coarse, rounded to subrounded	26-45
	28	Gravel, coarse to very coarse	45-73
	22	Till, black, sandy, very soft	73-95
Pierre	45	Shale, gray, greasy	95-140
		TD 140 feet	

121 47 30 adcd

Appendix B

B15

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SW¼SE¼NE¼ Section: 30 T. 121 N. R. 47 W.

Well: no Test Hole: B15 Land Owner:

County Grant Date 8-22-75 Elevation: 1110 (KB, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, black, moist	0-2
	21	Till, light brown, clayey, sandy	2-23
	6	Till, gray-brown, gravelly, clayey	23-29
	8	Silt, gray, fine	29-37
	113	Till, gray, clayey, silty, sandy	37-150
Pierre	10	Shale, gray, greasy	150-160
		TD 160 feet	

Appendix B B16

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NW¼NE¼ Section: 30 T. 121 N. S. R. 47 W. W.

Well: no Test Hole: B16 Land Owner:

County Grant Date 8-22-75 Elevation: 1085 XXXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	topsoil, brown, dry	0-3
	20	Till, light brown orange, with a few thin	
		lenses fine gravel	3-23
	5	Till, gray, gravelly, sandy, clayey	23-28
	26	Gravel, coarse, clayey, subangular	28-54
	6	Gravel, coarse, subangular to subrounded	54-60
	4	Till, gray, gravelly, sandy, clayey	60-64
	56	Gravel, coarse, subangular, with large amounts	
		of till	64-120
Pierre	15	Shale, gray, greasy	120-135
		TD 135 feet	

121 47 30 aacb

Appendix B B17

SOUTH DAKOTA GEOLOGICAL SURVEY

Location nw¼sw¼ne¼ne¼ Section: 30 T. 121 N. R. 47 W.

Well: no Test Hole: B17 Land Owner:

County Grant Date 8-22-75 Elevation: 1113 (XXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, brown, dry	0-2
	9	Till, orange-brown, gravelly, clayey	2-11
	11	Till, light-brown, sandy, clayey	11-22
	8	Till, gray, sandy, clayey	22-90
	40	Till, gray, sandy, clayey, with some thin	
		silty layers	90-130
Pierre	20	Shale, gray, greasy	130-150
		TD 150 feet	

Appendix B B18

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼NW¼SW¼ Section: 20 T. 121 N. R. 47 E. W.

Well: no Test Hole: B18 Land Owner:

County Grant Date 8-25-75 Elevation: 1083 (XXXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil	0-1
	1	Silt, black, soft	1-2
	6	Gravel, fine to medium, angular to subangular	2-8
	19	Gravel, medium to very coarse, subangular to	
		subrounded	8-27
	12	Gravel, fine to medium, subrounded	27-39
	2	Till, black, silty, sandy	39-41
	2	Gravel, medium to coarse, rounded	41-43
	3	Till, black, silty, sandy	43-46
	20	Gravel, medium to coarse, rounded, clean	46-66
	7	Till, black, silty, sandy	66-73
	94	Sand, medium to very coarse, subrounded	73-167
	4	Gravel, medium to very coarse, rounded	167-171
	24	Clay, black, with very fine silt	171-195
	2	Milbank Granodiorite	195-197
		TD 197 feet	

Appendix B B19

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼SE¼NE¼NE¼ Section: 30 T. 121 N. S. R. 47 W. W.

Well: no Test Hole: B19 Land Owner:

County Grant Date 8-26-75 Elevation: 1090 (XXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil, brown	0-2
	2	Sand, very coarse, subangular 1	2-4
	27	Gravel, coarse, subrounded, clean	4-31
	47	Sand, medium to coarse, subangular, clean	31-78
	3	Till, gray, sandy, clayey	78-81
	5	Sand, medium to coarse, subangular, clean	81-86
	7	Sand, gray, coarse, subrounded to subangular,	
		clean	86-90
	13	Gravel, gray, medium to coarse, subangular to	
		subrounded, clean	90-103
	5	Gravel, coarse, subangular to subrounded,	
		with some gray till	103-108
	26	Till, gray, gravelly, sandy, clayey	108-134
	3	Boulder, dolomite, white to light gray	134-137
	38	Till, both gray and brick red, sandy, clayey	137-175
	15	Shale, gray, greasy	175-190
		TD 190 feet	

121 47 29 bdaa

Appendix B B20

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼SE¼NW¼ Section: 29 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: B20 Land Owner:

County Grant Date 8-26-75 Elevation: 1074 (XXX, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	8	Silt, black to brown, fine	0-8
	7	Sand, coarse, subrounded, clean	8-15
	3	Gravel, medium, subrounded, clean	15-18
	7	Sand, gray, fine to very fine, subrounded, silty	18-25
	3	Silt, gray, very fine, some coal	25-28
	6	Sand, gray, very fine to medium interbedded	
		with gray silts and clays	28-34
	61	Sand, very fine to fine, subrounded	34-95
	80	Silt, gray, sandy, very clayey	95-175
	7	Silt, gray to black	175-182
	4	Clbbles and dolomite chips	182-186
	8	Till, gray and Red brown	186-194
	6	Milbank weathering surface, bluish white,	
		weathered granite	194-200
		TD 200 feet	

Appendix B B21

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼SE¼NE¼SW¼ Section: 20 T. 121 N. R. 47 E. W.

Well: no Test Hole: C21 Land Owner:

County Grant Date 8-27-75 Elevation: 1082 (A, T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoill	0-2
	22	Sand, very coarse, rounded with fine to	
		medium rounded gravel	2-24
	12	Gravel, coarse to very coarse, rounded	24-36
	8	Sand, coarse to medium, subrounded	36-44
	4	Till, gray to black, sandy, clayey	44-48
	11	Gravel, fine to medium with some till	48-59
	32	Till, gray to black, sandy, clayey	59-91
	6	Very hard layer-like chert	91-97
	7	Till, gray, sandy, clayey	97-104
	26	Shale, gray, greasy	104-130
		TD 130 feet	

121 47 29 babb

Appendix B

B22

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NW¼NW¼NE¼NW¼ Section: 29 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: B22 Land Owner:

County Grant Date 8-27-75 Elevation: 1082 (XXX T)

E-Log no Samples: yes Drilling Company: SDGS

Source of Data: Ralph Danzl

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Topsoil, brown	0-1
	4	Sand, very coarse, subrounded to fine	
		subrounded gravel	1-5
	11	Gravel, coarse to very coarse, subrounded	5-16
	30	Sand, very fine to medium with some coarse	
		subrounded	16-46
	24	Sand, medium to very coarse	46-70
	49	Sand, fine to coarse, very clayey	70-119
	11	Shale, reworked, gray	119-130
	10	Shale, gray, greasy, hard	130-140
		TD 140 feet	

121 48 25 bdba

Appendix B

B23

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NW¼SE¼NW¼ Section: 25 T. 121 N. R. 48 W.

Well: no Test Hole: B23 Land Owner:

County Grant Date 8-29-75 Elevation: (A, I, T)

E-Log no Samples: Drilling Company: SDGS

Source of Data: Greg Wallace

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Topsoil	0-2
	13	Sand, fine to medium, subspherical, subrounded,	
		primarily quartz, overall brown color	2-15
	19	Silt, black, coarse to medium	15-34
	49	Till, unoxidized, gray; mainly clay with sand;	
		several rocks (cobble to boulder) encountered	34-83
	22	Gravel, fine to medium; angular low sphericity,	
		made up of Milbank Shale, dolomite basalt;	
		dark gray granite chunks	83-105
Pierre	20	Shale, gray, greasy, compact	105-120

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SE¼SW¼SW¼ Section: 31 T. 121 N. ~~S~~ R. 47 ~~E~~ W.

Well: no Test Hole: C1 Land Owner:

County: Grant Date Elevation: 1126.02 (~~A~~,I,~~T~~)

E-Log: no Samples: Drilling Company: SDGS-Combination

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	3	Topsoil	0-3
	20	Till, yellow-brown, very sandy, clayey, pebbly	3-23
	7	Till, gray, sandy, clayey, pebbly	23-30
	8	Sand, coarse to fine gravel	30-38
	3	Sand, coarse to gravel, with gray clay	38-41
	27	Till, gray, clayey, pebbly, slightly sandy	41-68
	4	Sand, coarse to fine gravel, clayey	68-72
	7	Clay, gray, very sandy and gravelly	72-79
	5	Gravel, slightly clayey	79-84
	24	Till, gray, extremely sandy, also clayey	
		and pebbly	84-108
	21	Clay, gray, sandy, pebbly	108-129
	9	Clay, gray, pebbly	129-138
	22	Clay, gray, pebbly, shaley	138-160
		T.D. - 160 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼SE¼SW¼SW¼ Section: 32 T. 121 N. X S. R. 47 E X W.

Well: no Test Hole: C2 Land Owner:

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

E-Log: no Samples: Drilling Company: SDGS-Comb

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	27	Clay, brown, some pebbles	0-27
	7	Sand, fine to medium, uniform	27-34
	4	Clay, brown, with a few pebbles	34-38
	16	Clay, gray, pebbly	38-54
	8	Clay, gray, with medium to coarse sand and	
		fine gravel	54-62
	31	Sand ? very fine with clay	62-93
	2	Gravel, medium	93-95
		T.D. - 95 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼NE¼SE¼SE¼ Section: 33 T. 121 N. S. R. 47 E. W.

Well: no Test Hole: C3 Land Owner:

County: Grant Date Elevation: 1076 (A,T,K)

E-Log: no Samples: Drilling Company: SDGS-Combination

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	11	Till, yellow-brown, clayey, pebbly	0-11
	34	Till, gray, sandy, pebbly	12-46
	5	Sand	46-51
	25	Till, gray, shaley, pebbly	51-76
	11	Till, gray, very shaley, pebbly	76-87
	4	Gravel, medium to fine	87-91
	3	Shale, black	91-94
	4	Gravel	94-98
Pierre	27	Shale, grey, greasy	98-125
		T.D. - 125 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NE¼NE¼ Section: 34 T. 121 ~~N~~ ~~S~~ R. 47 E. ~~W~~.

Well: no Test Hole: C4 Land Owner:

County: Grant Date Elevation: 1072 (A,~~I~~,~~K~~)

E-Log: no Samples: Drilling Company: SDGS-Combination

Source of Data:

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	8	Clay, brown, silty, sandy, some pebbles	0-8
	19	Clay, brown, slightly silty and sandy, some	
		large pebbles	8-27
	20	Clay, gray, sandy, silty, slightly pebbly	27-47
	13	Clay, gray, very sandy and silty	47-60
	6	Sand, very coarse to fine gravel	60-66
	9	Clay, gray	66-75
	10	Sand, very coarse to fine gravel, clayey	75-85
	3	Clay, sandy, silty	85-88
	3	Sand	88-91
	1	Clay	91-92
	1	Sand, very fine	92-93
	21	Gravel ? fine to medium, some coarse, with	
		clay	93-114
	6	Sand, medium, clayey	114-120

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SW¼NW¼NW¼SW¼ Section: 3 T. 120 N. ~~S~~ R. 48 ~~E~~ W.

Well: _____ Test Hole: T5 Land Owner: _____

County: _____ Date 8-12-74 Elevation: _____ (A,I,T)

E-Log: _____ Samples: _____ Drilling Company: SDGS

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	2	Soil, black	0-2
	12	Clay, yellow-brown, pebbly (till), large rocks	2-14
	4	Clay, gray, pebbly, lot of rocks (till)	14-18
	81	Clay, gray, sandy, gravelly, gravel stringers	
		(till)	18-99
	5	Gravel	99-104
	19	Clay, gray, gravelly gravel stringers (till)	104-123
	14	Gravel	123-137
	73	Shale cuttings	137-210
	30	Shale & chalk, chalk effervesces, shale	210-240?
		is brown & slightly silty, some chatter	
	50	Sand, white, clayey, all quartz grains, takes	
		10-15 GMP while drilling, pink feldspar grains	
		from 281-290	240?-290
		Granite, white-pink-blk- rock flakes coming up	290
		T.D. - 290 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼SE¼ Section: 9 T. 120 N. ~~X~~ R. 48 ~~E~~. W.

Well: _____ Test Hole: T6 Land Owner: _____

County: Grant Date 8-13-74 Elevation: _____ (A,I,T)

E-Log: _____ Samples: _____ Drilling Company: SDGS

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	25	Clay, yellow-brown, very silty, pebbly (till)	0-25
	22	Clay, gray, very silty, pebbly (till)	25-47
	30	Gravel, coarse, a couple 2 foot clay breaks,	
		very coarse gravel 74-77	47=77
	48	Shale, black, greasy, slow, smooth drilling	77-125
		T.D. - 125 feet	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location SE¼SE¼SE¼NE¼ Section: 9 T. 120 N. S. R. 48 W. W.

Well: _____ Test Hole: C7 Land Owner: _____

County: Grant Date 8-13-74 Elevation: _____ (A,I,T)

E-Log: _____ Samples: _____ Drilling Company: SDGS

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	25	Clay, yellow-brown, pebbly (till), very silty	0-25
	17	Clay, gray, pebbly, very silty (till)	25-42
	7	Clay, gray, silty, pebbly, (till), gravel stringers	
		1 to 2 feet thick, rock at 46 feet	42-49
	11	Gravel, coarse, very good	49-60
	5	Clay, gray, sandy, pebbly (till)	60-65
	4	Sand, coarse, very good	65-69
	5	Gravel, very coarse or rocks	69-74
	6	Shale (??) break top 2 feet	74-80
		T.D. - 80 feet	
		Abandoned - farmer complained we were on his	
		land - measurement proved him right by 6 feet...	

SOUTH DAKOTA GEOLOGICAL SURVEY

Location NE¼NE¼NW¼NW¼ Section: 14 T. 120 N. ~~X~~ R. 48 E. W.

Well: _____ Test Hole: T8 Land Owner: _____

County: Grant Date 8-13-74 Elevation: _____ (A,I,T)

E-Log: _____ Samples: _____ Drilling Company: SDGS

Source of Data: _____

Geologic Unit	Thickness	Lithologic Description	From - to Feet
	1	Soil, sandy	0-1
	16	Clay, yellow-brown, rocky, pebbly (till)	1-17
	24	Clay, gray, pebbly (till), brittle cuttings	17-41
	2	Gravel stringer	41-43
	6	Clay, gray, pebbly, gravelly (till)	43-49
	14	Sand & gravel	49-63
	12	Clay, gray, pebbly, gravelly (till)	63-75
	2	Gravel stringer	75-77
	11	Clay, gray, pebbly, gravelly	77-88
	13	Gravel, medium to coarse	88-101
	6	Clay, gray, gravelly, gravel stringers (till)	101-107
	24	Shale cuttings	107-131
		Rock, hard, granite?	131-
		T.D. - 130 feet	