

STATE OF SOUTH DAKOTA  
George S. Mickelson, Governor

DEPARTMENT OF WATER AND NATURAL RESOURCES  
John J. Smith, Secretary

DIVISION OF GEOLOGICAL SURVEY  
Merlin J. Tipton, State Geologist

Open-File Report 47-UR

GROUND-WATER STUDY FOR THE CITY OF  
ELKTON, SOUTH DAKOTA

by

Dennis W. Tomhave

Science Center  
University of South Dakota  
Vermillion, South Dakota

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## INTRODUCTION

This report contains the results of a ground-water investigation conducted by the South Dakota Geological Survey for the city of Elkton, South Dakota. Field work was conducted from June 9 through June 16, 1983; from August 29 through August 31, 1983; and from May 29 through June 1, 1984. The investigation included: the drilling of 10 auger and 14 rotary test holes, 11 of which were completed as observation wells, and the collection and analysis of 15 water samples. This investigation was financed by the South Dakota Geological Survey, the East Dakota Water Development District, and the city of Elkton.

## BACKGROUND INFORMATION

Previous to the study, Elkton obtained its water from several shallow wells tapping the surficial Spring Creek aquifer within the city limits. These wells have, however, become contaminated with concentrations of nitrate-nitrogen which exceed the Environmental Protection Agency (EPA) limit of 10 parts per million (ppm).

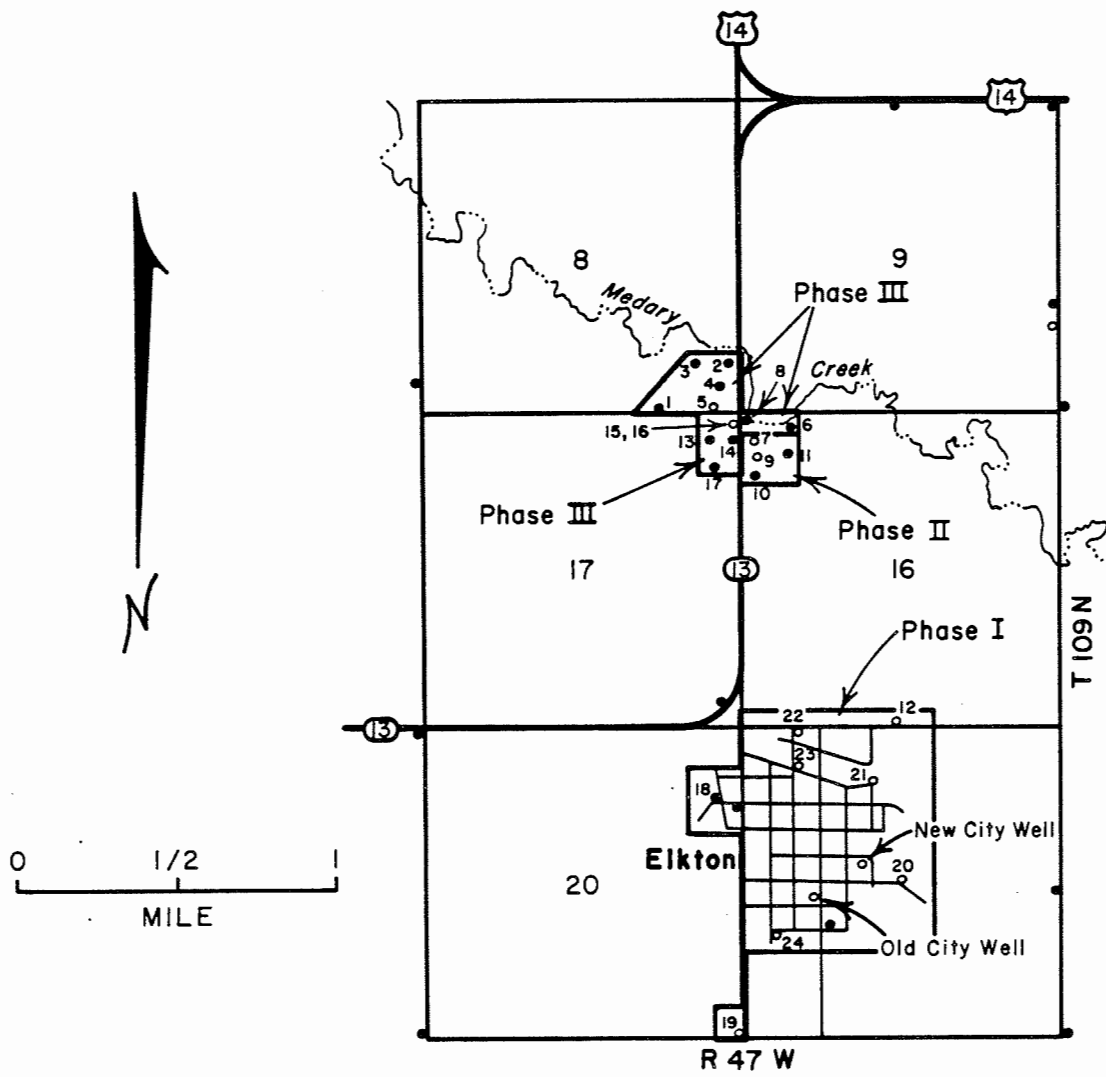
In an attempt to try to solve this problem, the city of Elkton hired a private company (Banner Associates, Inc., Brookings, South Dakota) to find a new source of drinking water. That investigation, conducted in March and April of 1979, included: the drilling of seven test holes, the installation of a 166-foot deep production well located in the SE NE SE sec. 9, T. 109 N., R. 47 W. (fig. 1), performance of an aquifer test, and the collection and analysis of a water sample (table 1). This production well which taps a buried aquifer did not, however, satisfy the city of Elkton and, consequently, the South Dakota Geological Survey was asked to help locate a new source of drinking water in the vicinity of Elkton. This investigation was then conducted in three phases.

## RESULTS OF INVESTIGATION

### Phase I

The first phase of investigative field work was conducted from June 9 through June 16, 1983. This phase of the investigation included the drilling of 10 auger test holes at map location (ML) 12, 15, 16 and 18 to 24 (fig. 1), the installation of 8 observation wells at ML 12, 16 and 19 to 24 (fig. 1), the collection and analysis of 10 water samples at ML 12, 16, 19 to 24 and the city wells (table 1), and surveying the elevations of six of the observation wells at ML 12 and 20 to 24 (app. A).

From this phase of the investigation it was found that the city of Elkton lies on the northwestern edge of a large body of surficial outwash sand and gravel called the Spring Creek aquifer.



- Test hole ————— Those with numbers are listed in appendix A according to the number (ML number). Logs of others are on file at the SD Geological Survey.
- Well —————

Phase I, II, III: Refers to areas investigated during different phases of the investigation.

Figure I. Data map.

TABLE 1. Water Quality

(1) Chemical Constituents -- Parts per million

Well ID (2)	Location (3)	SDGS Lab ID (4)	Date Sampled	Depth Well (ft) (5)	Conductivity (mmhos) (6)	TDS	Hardness as CaCO <sub>3</sub>	Fe	Mn	SO <sub>4</sub>	NO <sub>3</sub> -N	Na	Ca	Mg	K	Cl	F	HCO <sub>3</sub>
<b>SPRING CREEK AQUIFER (PHASE I)</b>																		
ML12	109N-47N-16CDDD	EKC-83-004	06/15/83	31	607	378	298	<0.05	<0.05	33	5.62	7	70	30	2.3	4	0.17	296
ML19	109N-47N-20DDDD	EKC-83-008	06/16/83	30	862	580	397	<0.05	0.07	79	8.36	27	95	39	3.0	21	0.23	399
ML20	109N-47N-21ACCC	EKC-83-010	06/15/83	49	563	374	289	0.15	0.26	22	7.34	15	70	28	2.9	8	0.28	305
ML21	109N-47N-21BADB	EKC-83-003	06/15/83	32	1390	1020	625	0.06	0.13	150	67.0	30	157	57	8.4	40	0.18	393
ML22	109N-47N-21BBAB	EKC-83-009	06/16/83	25	980	674	426	0.10	0.20	60	14.63	20	110	37	22.4	42	0.21	332
ML23	109N-47N-21BBAC	EKC-83-001	06/09/83	23	786	474	358	<0.05	0.10	84	9.21	18	91	32	4.4	17	0.24	327
ML24	109N-47N-21CBCA	EKC-83-002	06/15/83	21	812	544	384	0.13	<0.05	72	7.74	21	93	37	2.9	26	0.36	352
New City																		
Well	109N-47N-21BD	EKC-83-005	06/16/83	42	1000	744	484	<0.05	<0.05	98	32.0	21	114	48	3.2	39	0.21	341
Old City																		
Well	109N-47N-21CB	EKC-83-006	06/16/83	35	1000	668	486	<0.05	<0.05	105	16.89	21	115	48	2.7	42	0.34	402
<b>WEDARY CREEK AQUIFER</b>																		
<b>PHASE I</b>																		
ML16	109N-47N-17AAD2	EKC-83-007	06/15/83	20	602	374	316	0.15	0.44	20	0.86	12	75	31	1.9	4	0.25	377
<b>PHASE II</b>																		
ML7	109N-47N-1688BB	EKC-83-011	09/01/83	21	815	568	460	0.05	0.05	142	4.0	10	108	46	1.2	5	0.36	421
ML9	109N-47N-1688CB	EKC-83-012	09/01/83	17	676	450	361	0.7	0.21	65	2.7	10	88	34	1.2	10	0.49	341
<b>PHASE III</b>																		
ML5	109N-47N-80DDC	EKC-84-014	06/01/84	23	649	370	320	0.07	0.46	50	0.7	9	84	27	2.0	4	0.90	329
ML7	109N-47N-1688BB	EKC-84-013	06/01/84	21	839	466	447	0.11	<0.05	72	1.0	9	117	38	1.1	8	0.42	420
<b>BURIED AQUIFER</b>																		
Banner																		
Well	109N-47N-90AD	-----	04/19/79	166	863	---	380	0.38	0.40	29	0.50	48	104	29	2.0	8	----	566
<b>EPA LIMITS</b>																		
						500		0.3	0.05	250	10					250	2.4	
						(7)		(7)	(7)	(7)	(8)					(7)	(8)	

(1): TDS - total dissolved solids; Fe - iron; Mn - manganese; SO<sub>4</sub> - sulfate; NO<sub>3</sub>-N - nitrate-nitrogen; Na - sodium; Ca - calcium; Mg - magnesium; K - potassium; Cl - chloride; F - fluoride; HCO<sub>3</sub> - bicarbonate.

(2): Map location (ML) number - corresponds to number on figure 1 and in appendix A.

(3): See appendix A for explanation of location format.

(4): South Dakota Geological Survey Chemistry Laboratory identification number.

(5): Well depth is presented in feet below land surface.

(6): mmhos - micromhos.

(7): EPA recommended limits (U.S. Environmental Protection Agency, 1985b).

(8): EPA recommended limits (U.S. Environmental Protection Agency, 1985a).

-- Observation wells were cleaned with air lift and then sampled with a pitcher pump.

-- Samples collected from the City wells were taken directly from the well (submersible pump).

-- Banner well sampled during aquifer test (submersible pump).

fer, located between Medary Creek and Spring Creek. The outwash deposit generally increases in thickness from the west edge of town to the south-southeast, with the test hole at map location (ML) 20 (fig. 1) having sand and gravel to a depth of 50 feet and a saturated thickness of 27 feet (fig. 2). Water-level data (fig. 3) show that ground-water flow in this area is generally to the southeast toward Spring Creek, but is influenced a great deal by the pumping of the city wells.

Chemical analysis of water samples taken from the Spring Creek aquifer showed very high concentrations of nitrate-nitrogen (fig. 4). Observation wells at ML 21 and 22 and the city wells contain water which exceeds the Environmental Protection Agency (EPA) standard of 10 parts per million (ppm) (table 1). Observation wells at ML 12, 19, 20, 23 and 24 have water with nitrate-nitrogen concentrations ranging from 5.62 to 9.21 ppm.

During this phase of the investigation an additional test hole was drilled at ML 16 and an observation well installed. Water-quality data show a nitrate-nitrogen concentration of 0.86 ppm in water sampled at this location.

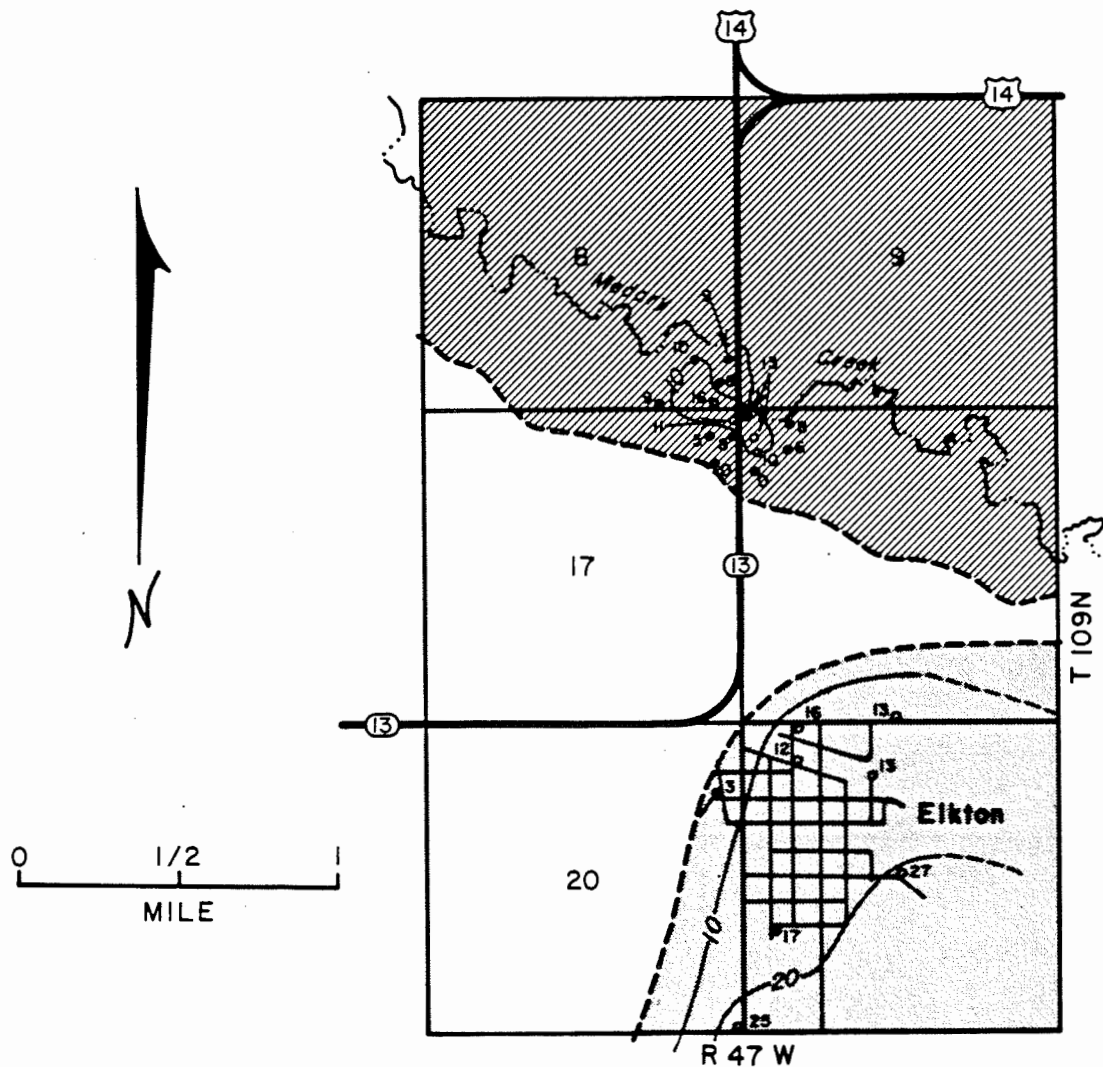
### Phase II

Based on results of work conducted in Phase I, it was recommended to the city to investigate in more detail the area around the observation well at ML 16. The city of Elkton obtained permission from the landowner to continue the investigation on a small piece of land in the northwest corner of sec. 16, T. 109 N., R. 47 W. (fig. 1). The second phase of the investigation was conducted from August 29 through August 31, 1983, and included the drilling of four rotary test holes at ML 7, 9, 10 and 11, the installation of two observation wells at ML 7 and 9, and the collection and analysis of two water samples at ML 7 and 9.

Test-hole data show that this area lies on the southern edge of a surficial outwash body, the Medary Creek aquifer. The thickness of the deposit in this area increases from south to north with the test hole at ML 7 having sand and gravel to a depth of 19 feet and a saturated thickness of 13 feet (fig. 2). Water-level data (fig. 3) show that the ground-water flow is generally to the north-northwest toward Medary Creek. Although the water quality appears to be very good at ML 7, a greater saturated thickness would be preferable for a municipal well.

### Phase III

As a result of Phase II findings, it was decided to expand the exploration area. The city of Elkton obtained permission to continue test drilling in the southeast corner of section 8, the northeast corner of section 17 and the northwest corner of section 16 (fig. 1). Phase III of the investigation was conducted

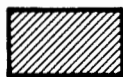


- <sup>12</sup> Test hole.
- <sup>6</sup> Observation well.

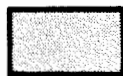
Numbers are saturated thickness of the aquifer, in feet. Test hole data are from water levels measured in open drill holes. Observation well data are from water levels measured on the well maintenance date (app. A).



Line connecting points of equal saturated thickness. Dashed where approximate. Contour interval = 10 feet.



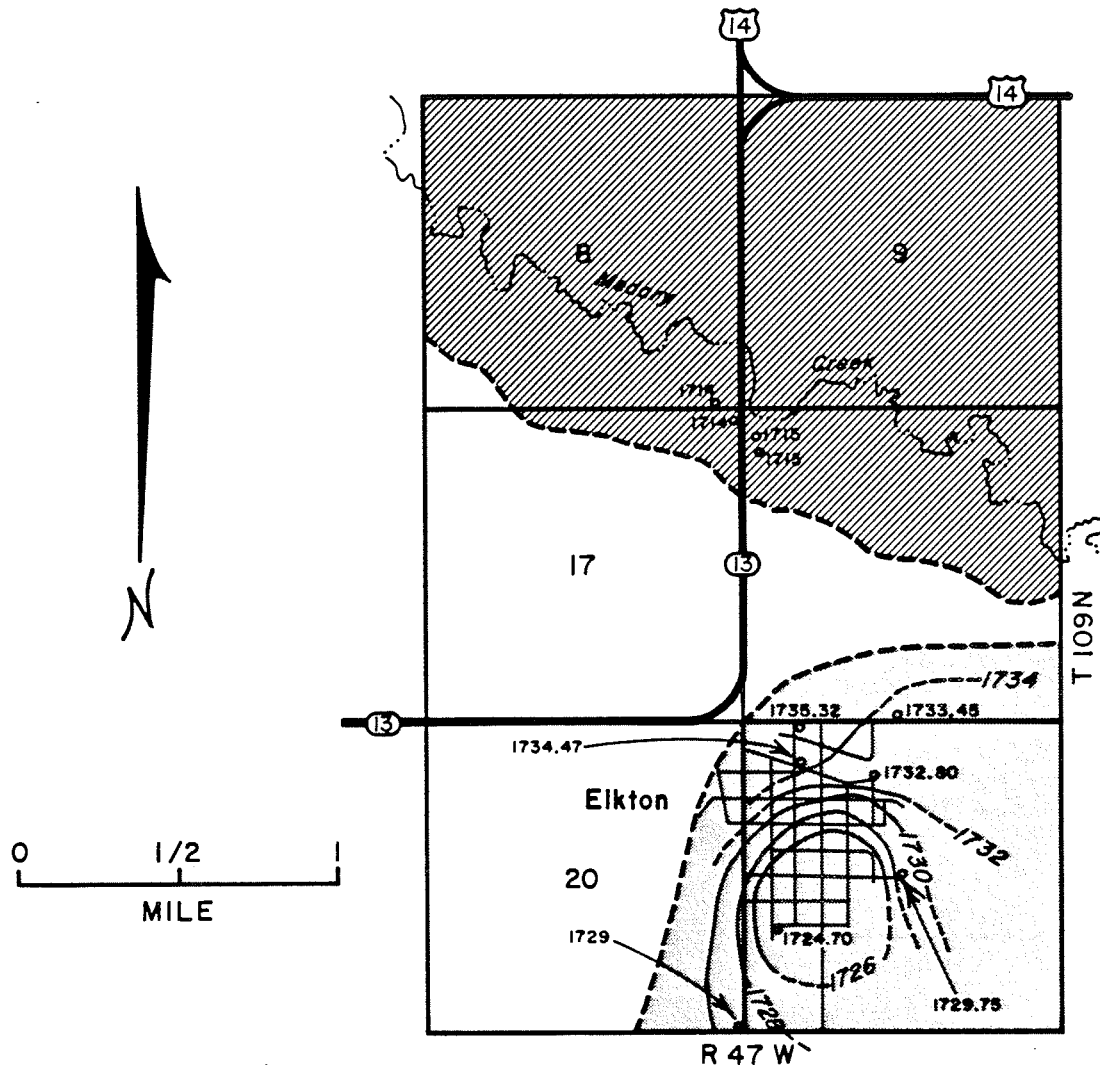
Approximate extent of Medary Creek aquifer.



Approximate extent of Spring Creek aquifer.

Spring Creek aquifer data are from unpublished work of R. Stach, J. Allen, and S. Chadima, SD Geological Survey.

Figure 2. Saturated thickness map.



Observation well. Number is elevation of water table, in feet above mean sea level. Measuring point elevations on wells were either estimated from a 7.5 minute topographic map or surveyed to nearest 0.01 foot: number without decimal point = estimated; with decimal point = surveyed.

— 1732 — Line connecting points of equal elevation on the water table surface. Dashed where approximate. Contour interval = 2 feet.



Approximate extent of Medary Creek aquifer.

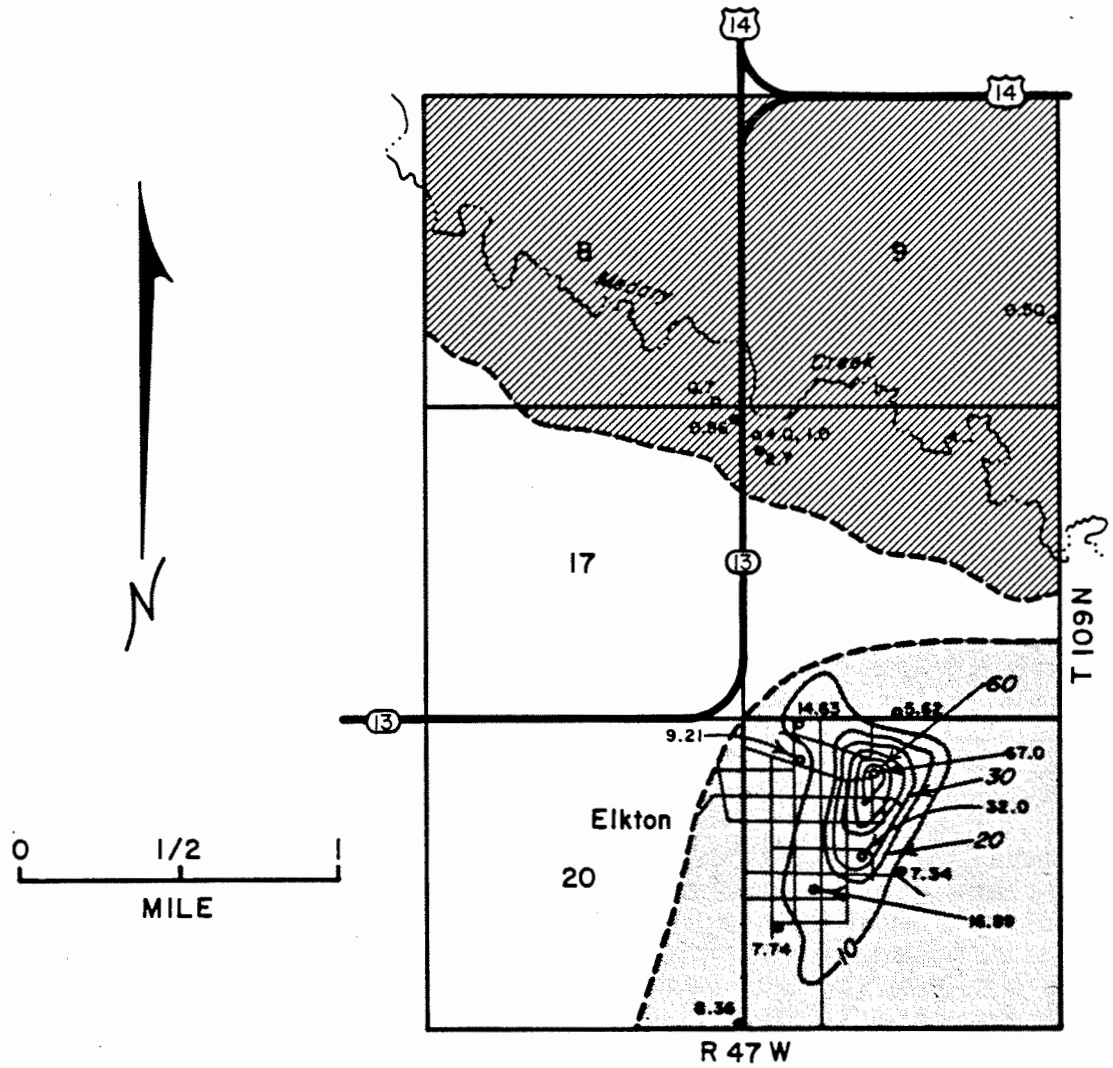


Approximate extent of Spring Creek aquifer.

Dates of water level measurements: Medary Creek aquifer, June 1, 1984; Spring Creek aquifer, June 15 and 16, 1983.

Figure 3. Water-level elevations.





5.62 Well. Number is concentration of nitrate-nitrogen in parts per million (ppm). See table I for water analysis and date of sample collection.

— 10 — Line connecting points of equal nitrate-nitrogen concentration. Contour interval = 10 ppm.

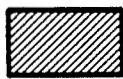

-  Approximate extent of Medary Creek aquifer.
-  Approximate extent of Spring Creek aquifer.

Figure 4. Nitrate-nitrogen concentrations.

from May 29 through June 1, 1984, and included the drilling of 10 rotary test holes at ML 1, 2, 3, 4, 5, 6, 8, 13, 14 and 17; the installation of one observation well at ML 5, and the collection of two water samples at ML 5 and 7.

The test hole at ML 5 in the southeast corner of section 8 penetrated sand and gravel to a depth of 21 feet and had a saturated thickness of 16 feet (fig. 2). It was the only test hole drilled during Phase III that encountered a greater saturated thickness than the test hole at ML 7 from the previous phase of investigation. Water-quality data (table 1) obtained from this observation well show that it is generally a good quality water but contains a high concentration of manganese (0.46 parts per million).

### CONCLUSIONS AND RECOMMENDATIONS

From Phase I of the investigation it was shown that the city of Elkton does indeed have a nitrate-nitrogen problem. The surficial Spring Creek aquifer has become contaminated with nitrate-nitrogen and the city wells are intercepting this contamination. Any new wells constructed in the Spring Creek aquifer near the city of Elkton most likely will eventually intercept the nitrate-nitrogen contaminant.

Data collected from Phases II and III show that the Medary Creek aquifer is separated from the Spring Creek aquifer north of the city and has a different ground water flow direction. Nitrate-nitrogen concentrations are low in this area, ranging from 0.7 ppm to 4.0 ppm. Observation wells at ML 5 and 16 did, however, have manganese concentrations exceeding the EPA recommended limits (0.46 ppm and 0.44 ppm, respectively). The Medary Creek aquifer in the study area also has a limited saturated thickness, ranging from 5 to 16 feet.

To ensure that the Medary Creek aquifer is suitable for municipal use, it is recommended that an aquifer test be conducted in the area between the observation wells at ML 5 and 7. The city should contact the Office of Water Rights, Department of Water and Natural Resources in Pierre, South Dakota, to obtain water rights and a permit to drill a well. The city should then hire a private company to drill a test well and conduct an aquifer test. Water levels should be measured during both the drawdown and recovery phases of the test in the pumping well and in several observation wells placed at varying distances from the pumping well. Also, at least one water sample should be collected during the test and sent to the Office of Drinking Water, Department of Water and Natural Resources, Pierre, South Dakota, to determine the biological and chemical suitability of the water. If requested by the city, the South Dakota Geological Survey will supervise the aquifer test and analyze the data.

The city also has the option of using the well installed by Banner Associates, Inc. for their drinking water needs. Water analyzed from this well showed a low concentration of nitrate-nitrogen (0.50 ppm). Concentrations of iron (0.38 ppm) and manganese (0.40 ppm), however, exceed the recommended EPA limits (table 1).

The city could also hook up to the Brookings-Deuel Rural Water System, which would supply water suitable for municipal use. The city should evaluate the costs of each of these options to determine the best way to alleviate their nitrate-nitrogen problem.

#### REFERENCES

- Banner Associates, Inc., 1979, Study for the city of Elkton, water supply test data, unpublished.
- Stach, R., Allen, J., and Chadima, S., Draft final report, Big Sioux Aquifer Study, Part I: South Dakota Geological Survey Open-File Report, unpublished.
- Tomhave, Dennis W., 1987, Sand and gravel resources in Brookings County, South Dakota: South Dakota Geological Survey Information Pamphlet 38.
- U.S. Environmental Protection Agency, 1985a, National interim primary drinking water standards - maximum contaminant levels for inorganic chemicals: Code of Federal Regulations, Title 40, Part 141, Section 141.11, p. 523-524.
- \_\_\_\_\_ 1985b, National secondary drinking water regulations - secondary maximum contaminant levels: Code of Federal Regulations, Title 40, Part 143, Section 143.3, p. 584.

## APPENDIX A

### Logs of test holes and observations wells drilled for this investigation

#### MAP LOCATION (ML)

A number which is assigned to the log according to the order in which it is listed (see **LEGAL LOCATION and LOCATION**). This number corresponds to the numbers shown on figure 1.

#### LEGAL LOCATION and LOCATION

The logs are listed by smallest township number, then the smallest range number, the smallest section number, and then by quarter section: NE = A; NW = B; SW = C; SE = D. A comparison of **LEGAL LOCATION and LOCATION** is as follows. A **LEGAL LOCATION** of NW NE NW NW sec. 21, T. 109 N., R. 47 W. is the same of a **LOCATION** of 109N-47W-21BBAB.

#### LATITUDE and LONGITUDE

The format is **DD.MMSS** where **D** is degrees, **M** is minutes, and **S** is seconds.

#### DRILLING COMPANY

SDGS is an abbreviation for South Dakota Geological Survey.

#### TOTAL DRILL HOLE DEPTH and SCREEN LENGTH

The number are presented in feet.

#### SCREEN TYPE and CASING TYPE

PVC - polyvinyl chloride

#### CASING TOP ELEVATION and GROUND SURFACE ELEVATION

The numbers are presented in feet above mean sea level. The elevations with the letter **T** were taken from topographic maps and those with the letter **I** were obtained using surveying instruments.

#### CASING DIAMETER

The numbers are presented in inches.

COUNTY: BROOKINGS

LOCATION: 109N-47W-08DCDD

MAP LOCATION: 1

LEGAL LOCATION: SE SE SW SE SEC. 08, T. 109 N., R. 47 W.

LATITUDE: 44.1515

LONGITUDE: 96.2929

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: S. MITCHELL

DRILLER'S LOG:

GEOLOGIST: D. TOMHAVE

GEOLOGIST'S LOG: X

DATE DRILLED: 05-31-1984

DRILLING METHOD: ROTARY

GROUND SURFACE ELEVATION: 1717.00 T

TOTAL DRILL HOLE DEPTH: 26.0

TEST HOLE NUMBER: CO-84-7

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL:

SINGLE POINT RESISTIVITY:

NATURAL GAMMA:

EXTRA:

SAMPLES:

0	-	3.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
3.0	-	5.0	CLAY, BROWN, SILTY, SANDY
5.0	-	14.0	GRAVEL, BROWN, FINE TO MEDIUM, SANDY; OXIDIZED
14.0	-	26.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS

LOCATION: 109N-47W-08DDAD

MAP LOCATION: 2

LEGAL LOCATION: SE NE SE SE SEC. 08, T. 109 N., R. 47 W.

LATITUDE: 44.1522

LONGITUDE: 96.2911

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: S. MITCHELL

DRILLER'S LOG:

GEOLOGIST: D. TOMHAVE

GEOLOGIST'S LOG: X

DATE DRILLED: 05-30-1984

DRILLING METHOD: ROTARY

GROUND SURFACE ELEVATION: 1719.00 T

TOTAL DRILL HOLE DEPTH: 26.0

TEST HOLE NUMBER: CO-84-3

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL:

SINGLE POINT RESISTIVITY:

NATURAL GAMMA:

EXTRA:

SAMPLES:

0	-	4.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
4.0	-	6.0	CLAY, BROWN, SILTY, SANDY (ALLUVIUM)
6.0	-	15.0	GRAVEL, BROWN, FINE TO MEDIUM; SOME COARSE SAND
15.0	-	26.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-08DDBD  
MAP LOCATION: 3  
LEGAL LOCATION: SE NW SE SE SEC. 08, T. 109 N., R. 47 W.  
LATITUDE: 44.1524 LONGITUDE: 96.2921  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-30-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1718.00 T  
TOTAL DRILL HOLE DEPTH: 26.0 TEST HOLE NUMBER: CO-84-2  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	4.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
4.0	-	7.0	SAND, BROWN, MEDIUM, GRAVELLY
7.0	-	14.0	GRAVEL, BROWN, FINE TO MEDIUM, SANDY
14.0	-	26.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-08DDBD  
MAP LOCATION: 4  
LEGAL LOCATION: NW SE SE SE SEC. 08, T. 109 N., R. 47 W.  
LATITUDE: 44.1520 LONGITUDE: 96.2915  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-30-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1725.00 T  
TOTAL DRILL HOLE DEPTH: 36.0 TEST HOLE NUMBER: CO-84-1  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	3.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
3.0	-	7.0	SAND, BROWN, FINE, SILTY
7.0	-	15.0	GRAVEL, BROWN, FINE TO MEDIUM, SANDY; SOME COARSE GRAVEL
15.0	-	21.0	CLAY, BROWN, SILTY, SANDY, PEBBLY; OXIDIZED (TILL)
21.0	-	36.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-08DDDC  
MAP LOCATION: 5  
LEGAL LOCATION: SW SE SE SE SEC. 08, T. 109 N., R. 47 W.  
LATITUDE: 44.1515 LONGITUDE: 96.2917  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-30-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1719.00 T  
TOTAL DRILL HOLE DEPTH: 36.0 TEST HOLE NUMBER: CO-84-4  
WATER RIGHTS WELL: SDGS WELL NAME: CO-84-4  
OTHER WELL NAME:  
BASIN: BIG SIOUX AQUIFER: BIG SIOUX  
MANAGEMENT UNIT: AURORA  
SCREEN TYPE: PVC, MFG. SCREEN LENGTH: 5.0  
CASING TYPE: PVC CASING DIAMETER: 2.0  
CASING TOP ELEVATION: 1721.00 T  
CASING STICK-UP: 2.00 TOTAL CASING AND SCREEN: 23.0  
WELL MAINTENANCE DATE: 05-31-1984  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:  
0 - 4.0 CLAY, BLACK, SILTY, SANDY (TOPSOIL)  
4.0 - 5.0 CLAY, BROWN, SILTY, SANDY  
5.0 - 21.0 GRAVEL, BROWN, FINE TO MEDIUM, SANDY;  
OXIDIZED  
21.0 - 36.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16BBAB  
MAP LOCATION: 6  
LEGAL LOCATION: NW NE NW NW SEC. 16, T. 109 N., R. 47 W.  
LATITUDE: 44.1513 LONGITUDE: 96.2856  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-30-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1722.00 T  
TOTAL DRILL HOLE DEPTH: 26.0 TEST HOLE NUMBER: CO-84-5  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0 - 3.0 CLAY, BLACK, SILTY, SANDY (TOPSOIL)  
 3.0 - 5.0 CLAY, BROWN, SILTY, SANDY; OXIDIZED  
 5.0 - 14.0 GRAVEL, BROWN, FINE TO MEDIUM, SANDY;  
 OXIDIZED  
 14.0 - 26.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
 UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16BBB  
 MAP LOCATION: 7  
 LEGAL LOCATION: NW NW NW SEC. 16, T. 109 N., R. 47 W.  
 LATITUDE: 44.1512 LONGITUDE: 96.2905  
 LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: C. SCHMIG DRILLER'S LOG:  
 GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
 DATE DRILLED: 08-30-1983 DRILLING METHOD: ROTARY  
 GROUND SURFACE ELEVATION: 1721.00 T  
 TOTAL DRILL HOLE DEPTH: 35.0 TEST HOLE NUMBER: R2-83-119  
 WATER RIGHTS WELL: SDGS WELL NAME: R2-83-119  
 OTHER WELL NAME:  
 BASIN: BIG SIOUX AQUIFER: BIG SIOUX  
 MANAGEMENT UNIT: AURORA  
 SCREEN TYPE: PVC, MFG. SCREEN LENGTH: 5.0  
 CASING TYPE: PVC CASING DIAMETER: 2.0  
 CASING TOP ELEVATION: 1723.20 T  
 CASING STICK-UP: 2.20 TOTAL CASING AND SCREEN: 21.2  
 WELL MAINTENANCE DATE: 09-01-1983  
 USGS HYDROLOGICAL UNIT CODE: 10170202  
 ELECTRIC LOG INFORMATION:  
 SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
 NATURAL GAMMA: EXTRA:  
 SAMPLES:

0 - 1.0 CLAY, BLACK (TOPSOIL)  
 1.0 - 19.0 SAND AND GRAVEL, BROWN; GRADES FROM A  
 FINE SAND TO A MEDIUM GRAVEL  
 19.0 - 35.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
 UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16BBB 2  
 MAP LOCATION: 8  
 LEGAL LOCATION: NW NW NW SEC. 16, T. 109 N., R. 47 W.  
 LATITUDE: 44.1514 LONGITUDE: 96.2907  
 LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: S. MITCHELL DRILLER'S LOG:  
 GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
 DATE DRILLED: 05-31-1984 DRILLING METHOD: ROTARY



GROUND SURFACE ELEVATION: 1720.00 T  
TOTAL DRILL HOLE DEPTH: 26.0 TEST HOLE NUMBER: CO-84-6  
USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	4.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
4.0	-	9.0	SAND, BLACKISH-BROWN, FINE TO MEDIUM, SILTY
9.0	-	16.0	GRAVEL, BROWN, FINE TO MEDIUM, SANDY; OXIDIZED
16.0	-	26.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16BBCB  
MAP LOCATION: 9  
LEGAL LOCATION: NW SW NW NW SEC. 16, T. 109 N., R. 47 W.  
LATITUDE: 44.1509 LONGITUDE: 96.2904  
LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: M. JARRETT

DRILLER'S LOG:

GEOLOGIST: D. TOMHAVE

GEOLOGIST'S LOG: X

DATE DRILLED: 08-30-1983

DRILLING METHOD: ROTARY

GROUND SURFACE ELEVATION: 1719.00 T

TOTAL DRILL HOLE DEPTH: 20.0

TEST HOLE NUMBER: R2-83-120

WATER RIGHTS WELL:

SDGS WELL NAME: R2-83-120

OTHER WELL NAME:

BASIN: BIG SIOUX

AQUIFER: BIG SIOUX

MANAGEMENT UNIT: AURORA

SCREEN TYPE: PVC, MFG.

SCREEN LENGTH: 5.0

CASING TYPE: PVC

CASING DIAMETER: 2.0

CASING TOP ELEVATION: 1721.60 T

CASING STICK-UP: 2.60

TOTAL CASING AND SCREEN: 17.1

WELL MAINTENANCE DATE: 09-01-1983

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	1.0	CLAY, BLACK (TOPSOIL)
1.0	-	14.0	SAND AND GRAVEL, BROWN; GRADES FROM A MEDIUM SAND TO A COARSE GRAVEL
14.0	-	20.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS

LOCATION: 109N-47W-16BBCC

MAP LOCATION: 10  
 LEGAL LOCATION: SW SW NW NW SEC. 16, T. 109 N., R. 47 W.  
 LATITUDE: 44.1504 LONGITUDE: 96.2905  
 LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: M. THOMPSON DRILLER'S LOG:  
 GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
 DATE DRILLED: 08-29-1983 DRILLING METHOD: ROTARY  
 GROUND SURFACE ELEVATION: 1721.00 T  
 TOTAL DRILL HOLE DEPTH: 150.0 TEST HOLE NUMBER: R2-83-118  
 USGS HYDROLOGICAL UNIT CODE: 10170202  
 ELECTRIC LOG INFORMATION:  
 SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
 NATURAL GAMMA: EXTRA:  
 SAMPLES:

0	-	2.0	CLAY, BLACK (TOPSOIL)
2.0	-	9.0	GRAVEL, BROWN, MEDIUM TO COARSE; OXIDIZED
9.0	-	68.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)
68.0	-	84.0	CLAY, YELLOWISH-BROWN, SILTY, SANDY, PEBBLY; OXIDIZED (TILL)
84.0	-	116.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)
116.0	-	117.0	GRAVEL, BROWN, MEDIUM; OXIDIZED
117.0	-	119.0	CLAY, BROWN, SILTY, SANDY, PEBBLY; OXIDIZED (TILL)
119.0	-	120.0	GRAVEL, BROWN, FINE; OXIDIZED
120.0	-	150.0	CLAY, YELLOWISH-BROWN, SILTY, SANDY, PEBBLY; OXIDIZED, HIT ROCK, ABANDONED HOLE (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16BBDB  
 MAP LOCATION: 11  
 LEGAL LOCATION: NW SE NW NW SEC. 16, T. 109 N., R. 47 W.  
 LATITUDE: 44.1509 LONGITUDE: 96.2857  
 LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: M. THOMPSON DRILLER'S LOG:  
 GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
 DATE DRILLED: 08-30-1983 DRILLING METHOD: ROTARY  
 GROUND SURFACE ELEVATION: 1719.00 T  
 TOTAL DRILL HOLE DEPTH: 20.0 TEST HOLE NUMBER: R2-82-121  
 USGS HYDROLOGICAL UNIT CODE: 10170202  
 ELECTRIC LOG INFORMATION:  
 SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
 NATURAL GAMMA: EXTRA:  
 SAMPLES:

0	-	4.0	CLAY, BLACK (ALLUVIUM)
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4.0 - 10.0 GRAVEL, BROWN, MEDIUM TO COARSE; OXIDIZED  
10.0 - 20.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-16CDDD  
MAP LOCATION: 12  
LEGAL LOCATION: SE SE SE SW SEC. 16, T. 109 N., R. 47 W.  
LATITUDE: 44.1424 LONGITUDE: 96.2833  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: M. YESKE DRILLER'S LOG:  
GEOLOGIST: J. ALLEN GEOLOGIST'S LOG: X  
DATE DRILLED: 06-10-1983 DRILLING METHOD: AUGER  
GROUND SURFACE ELEVATION: 1750.00 T  
TOTAL DRILL HOLE DEPTH: 38.0 TEST HOLE NUMBER: A1-83-14  
WATER RIGHTS WELL: SDGS WELL NAME: A1-83-14  
OTHER WELL NAME:  
BASIN: BIG SIOUX AQUIFER: BIG SIOUX  
MANAGEMENT UNIT: AURORA  
SCREEN TYPE: SCREEN LENGTH: 5.0  
CASING TYPE: PVC CASING DIAMETER: 2.0  
CASING TOP ELEVATION: 1752.49 I  
CASING STICK-UP: 1.60 TOTAL CASING AND SCREEN: 33.5  
WELL MAINTENANCE DATE: 06-10-1983  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0 - 1.0 SILT, BLACK, CLAYEY; MOIST (TOPSOIL)  
1.0 - 6.0 CLAY, BROWN, SILTY; OXIDIZED, MOIST  
6.0 - 20.0 GRAVEL, RED-BROWN, COARSE, SANDY;  
OXIDIZED, MOIST  
20.0 - 30.0 GRAVEL, RED-BROWN, COARSE, SANDY;  
OXIDIZED, SATURATED  
30.0 - 38.0 CLAY, GRAY-GREEN, PEBBLY; MOIST (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-17AAAC  
MAP LOCATION: 13  
LEGAL LOCATION: SW NE NE NE SEC. 17, T. 109 N., R. 47 W.  
LATITUDE: 44.1510 LONGITUDE: 96.2915  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-31-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1718.00 T

TOTAL DRILL HOLE DEPTH: 16.0 TEST HOLE NUMBER: CO-84-9  
USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0 - 4.0 CLAY, BLACK, SILTY, SANDY (TOPSOIL)  
4.0 - 9.0 GRAVEL, BROWN, FINE TO MEDIUM, SANDY;  
SOME COARSE GRAVEL, OXIDIZED  
9.0 - 16.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS

LOCATION: 109N-47W-17AAAD

MAP LOCATION: 14

LEGAL LOCATION: SE NE NE NE SEC. 17, T. 109 N., R. 47 W.

LATITUDE: 44.1510

LONGITUDE: 96.2910

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: S. MITCHELL

DRILLER'S LOG:

GEOLOGIST: D. TOMHAVE

GEOLOGIST'S LOG: X

DATE DRILLED: 05-31-1984

DRILLING METHOD: ROTARY

GROUND SURFACE ELEVATION: 1716.00 T

TOTAL DRILL HOLE DEPTH: 16.0

TEST HOLE NUMBER: CO-84-8

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0 - 4.0 CLAY, BLACK, SILTY, SANDY (TOPSOIL)  
4.0 - 12.0 GRAVEL, BROWN, FINE TO MEDIUM, SANDY;  
OXIDIZED  
12.0 - 16.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
UNOXIDIZED (TILL)

\* \* \* \*

COUNTY: BROOKINGS

LOCATION: 109N-47W-17AAAD 1

MAP LOCATION: 15

LEGAL LOCATION: SE NE NE NE SEC. 17, T. 109 N., R. 47 W.

LATITUDE: 44.1513

LONGITUDE: 96.2910

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: M. YESKE

DRILLER'S LOG:

GEOLOGIST: J. ALLEN

GEOLOGIST'S LOG: X

DATE DRILLED: 06-13-1983

DRILLING METHOD: AUGER

GROUND SURFACE ELEVATION: 1715.00 T

TOTAL DRILL HOLE DEPTH: 15.0

TEST HOLE NUMBER: A2-83-7

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL:  
NATURAL GAMMA:  
SAMPLES:

SINGLE POINT RESISTIVITY:  
EXTRA:

0	-	3.0	CLAY, BLACK, VERY SILTY, SANDY, PEBBLY; MOIST (TOPSOIL)
3.0	-	6.0	CLAY, BLACK, SILTY, SANDY; MOIST
6.0	-	14.0	GRAVEL, DARK-BROWN, MEDIUM TO COARSE, SANDY; SATURATED
14.0	-	15.0	ROCK; INTERVAL PENETRATED ONLY A FEW INCHES, ABANDONED HOLE

\* \* \* \*

COUNTY: BROOKINGS

LOCATION: 109N-47W-17AAAD 2

MAP LOCATION: 16

LEGAL LOCATION: SE NE NE NE SEC. 17, T. 109 N., R. 47 W.

LATITUDE: 44.1513

LONGITUDE: 96.2910

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: L. THOMAS

DRILLER'S LOG:

GEOLOGIST: J. ALLEN

GEOLOGIST'S LOG: X

DATE DRILLED: 06-09-1983

DRILLING METHOD: AUGER

GROUND SURFACE ELEVATION: 1717.00 T

TOTAL DRILL HOLE DEPTH: 33.0

TEST HOLE NUMBER: A2-83-8

WATER RIGHTS WELL:

SDGS WELL NAME: A2-83-8

OTHER WELL NAME:

BASIN: BIG SIOUX

AQUIFER: BIG SIOUX

MANAGEMENT UNIT: AURORA

SCREEN TYPE: PVC

SCREEN LENGTH: 5.0

CASING TYPE: PVC

CASING DIAMETER: 2.0

CASING TOP ELEVATION:

CASING STICK-UP: 2.00

TOTAL CASING AND SCREEN: 20.4

WELL MAINTENANCE DATE:

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL:  
NATURAL GAMMA:  
SAMPLES:

SINGLE POINT RESISTIVITY:  
EXTRA:

0	-	1.0	CLAY, BLACK, SILTY, SANDY; MOIST (TOPSOIL)
1.0	-	5.0	CLAY, BLACKISH-GRAY, SILTY; MOIST
5.0	-	16.0	GRAVEL, BLACKISH-GRAY, SILTY, SANDY; SATURATED
16.0	-	20.0	CLAY, GRAY-GREEN, SILTY, SANDY, PEBBLY; PARTIALLY OXIDIZED
20.0	-	33.0	CLAY, GRAY, SANDY, SILTY, PEBBLY; UNOXIDIZED, MOIST (TILL)

\* \* \* \*

COUNTY: BROOKINGS LOCATION: 109N-47W-17AADC  
MAP LOCATION: 17  
LEGAL LOCATION: SW SE NE NE SEC. 17, T. 109 N., R. 47 W.  
LATITUDE: 44.1506 LONGITUDE: 96.2914

LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: S. MITCHELL DRILLER'S LOG:  
GEOLOGIST: D. TOMHAVE GEOLOGIST'S LOG: X  
DATE DRILLED: 05-31-1984 DRILLING METHOD: ROTARY  
GROUND SURFACE ELEVATION: 1721.00 T  
TOTAL DRILL HOLE DEPTH: 46.0 TEST HOLE NUMBER: CO-84-10  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	3.0	CLAY, BLACK, SILTY, SANDY (TOPSOIL)
3.0	-	11.0	GRAVEL, BROWN, FINE TO MEDIUM, SANDY; SOME COARSE GRAVEL, OXIDIZED
11.0	-	46.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED (TILL)

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COUNTY: BROOKINGS LOCATION: 109N-47W-20AADC  
MAP LOCATION: 18  
LEGAL LOCATION: SW SE NE NE SEC. 20, T. 109 N., R. 47 W.  
LATITUDE: 44.1409 LONGITUDE: 96.2933  
LAND OWNER:

PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: L. THOMAS DRILLER'S LOG:  
GEOLOGIST: J. ALLEN GEOLOGIST'S LOG: X  
DATE DRILLED: 06-09-1983 DRILLING METHOD: AUGER  
GROUND SURFACE ELEVATION:  
TOTAL DRILL HOLE DEPTH: 43.0 TEST HOLE NUMBER: A1-83-12  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	1.0	SILT, DARK-BROWN; DRY
1.0	-	4.0	CLAY, BROWN, SILTY; OXIDIZED, MOIST
4.0	-	7.0	SAND, LIGHT-BROWN, COARSE, SILTY; OXIDIZED, SATURATED
7.0	-	28.0	CLAY, BROWN, PEBBLY; OXIDIZED, SATURATED
28.0	-	43.0	CLAY, GRAY-BROWN, PEBBLY; UNOXIDIZED SATURATED

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SCREEN TYPE: PVC SCREEN LENGTH: 5.0  
CASING TYPE: PVC CASING DIAMETER: 2.0  
CASING TOP ELEVATION: 1755.46 I  
CASING STICK-UP: 2.40 TOTAL CASING AND SCREEN: 49.0

WELL MAINTENANCE DATE: 06-10-1983  
USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	3.0	CLAY, BLACK, SILTY; MOIST (TOPSOIL)
3.0	-	5.0	CLAY, BROWN, SILTY, SANDY, PEBBLY; OXIDIZED, MOIST
5.0	-	19.0	SAND, BROWN, COARSE, SILTY, OXIDIZED, MOIST
19.0	-	30.0	GRAVEL, BROWN, COARSE; OXIDIZED, SATURATED
30.0	-	50.0	GRAVEL, BROWN; OXIDIZED, SATURATED
50.0	-	63.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED; MOIST (TILL)

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COUNTY: BROOKINGS

LOCATION: 109N-47W-21BADB

MAP LOCATION: 21

LEGAL LOCATION: NW SE NE NW SEC. 21, T. 109 N., R. 47 W.

LATITUDE: 44.1416

LONGITUDE: 96.2838

LAND OWNER:

PROJECT: ELKTON CITY STUDY

DRILLING COMPANY: SDGS

DRILLER: L. THOMAS

DRILLER'S LOG:

GEOLOGIST: J. ALLEN

GEOLOGIST'S LOG: X

DATE DRILLED: 06-14-1983

DRILLING METHOD: AUGER

GROUND SURFACE ELEVATION: 1751.00 T

TOTAL DRILL HOLE DEPTH: 43.0

TEST HOLE NUMBER: A2-83-10

WATER RIGHTS WELL:

SDGS WELL NAME: A2-83-10

OTHER WELL NAME:

BASIN: BIG SIOUX

AQUIFER: BIG SIOUX

MANAGEMENT UNIT: ELKTON

SCREEN TYPE: PVC

SCREEN LENGTH: 5.0

CASING TYPE: PVC

CASING DIAMETER: 2.0

CASING TOP ELEVATION: 1752.25 I

CASING STICK-UP: 1.30

TOTAL CASING AND SCREEN: 31.5

WELL MAINTENANCE DATE: 06-14-1983

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0	-	1.0	CLAY, BLACK, SILTY; MOIST (TOPSOIL)
1.0	-	6.0	SILT, DARK-BROWN, SILTY, SANDY; OXIDIZED, MOIST



6.0 - 20.0 GRAVEL, BROWN, MEDIUM, CLAYEY, SANDY,  
PEBBLY; OXIDIZED, MOIST, POORLY SORTED  
20.0 - 31.0 GRAVEL, BROWN, MEDIUM, CLAYEY, SANDY,  
PEBBLY; OXIDIZED, SATURATED  
31.0 - 43.0 CLAY, GRAY, SILTY, SANDY, PEBBLY;  
UNOXIDIZED (TILL)

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COUNTY: BROOKINGS LOCATION: 109N-47W-21BBAB  
MAP LOCATION: 22  
LEGAL LOCATION: NW NE NW NW SEC. 21, T. 109 N., R. 47 W.  
LATITUDE: 44.1424 LONGITUDE: 96.2855  
LAND OWNER:  
PROJECT: ELKTON CITY STUDY  
DRILLING COMPANY: SDGS  
DRILLER: M. YESKE DRILLER'S LOG:  
GEOLOGIST: J. ALLEN GEOLOGIST'S LOG: X  
DATE DRILLED: 06-15-1983 DRILLING METHOD: AUGER  
GROUND SURFACE ELEVATION: 1745.00 T  
TOTAL DRILL HOLE DEPTH: 43.0 TEST HOLE NUMBER: A2-83-11  
WATER RIGHTS WELL: SDGS WELL NAME: A2-83-11  
OTHER WELL NAME:  
BASIN: BIG SIOUX AQUIFER: BIG SIOUX  
MANAGEMENT UNIT: ELKTON  
SCREEN TYPE: PVC SCREEN LENGTH: 5.0  
CASING TYPE: PVC CASING DIAMETER: 2.0  
CASING TOP ELEVATION: 1747.49 I  
CASING STICK-UP: 2.00 TOTAL CASING AND SCREEN: 24.9  
WELL MAINTENANCE DATE: 06-16-1983  
USGS HYDROLOGICAL UNIT CODE: 10170202  
ELECTRIC LOG INFORMATION:  
SPONTANEOUS POTENTIAL: SINGLE POINT RESISTIVITY:  
NATURAL GAMMA: EXTRA:  
SAMPLES:

0 - 1.0 SILT, DARK-BROWN; OXIDIZED, MOIST  
(TOPSOIL)  
1.0 - 3.0 CLAY, GREEN-BROWN, PEBBLY, SILTY;  
OXIDIZED, MOIST  
3.0 - 10.0 GRAVEL, RED-BROWN, SANDY, CLAYEY;  
OXIDIZED, MOIST  
10.0 - 11.0 SAND, GRAY-WHITE, MEDIUM; OXIDIZED,  
MOIST, VERY CLEAN, WELL SORTED  
11.0 - 26.0 SAND, GRAY-WHITE, MEDIUM; OXIDIZED,  
SATURATED, VERY CLEAN, WELL SORTED  
26.0 - 43.0 CLAY, GRAY-BLUE, SILTY, SANDY, PEBBLY

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COUNTY: BROOKINGS LOCATION: 109N-47W-21BBAC  
MAP LOCATION: 23  
LEGAL LOCATION: SW NE NW NW SEC. 21, T. 109 N., R. 47 W.  
LATITUDE: 44.1418 LONGITUDE: 96.2855

LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: L. THOMAS  
 GEOLOGIST: J. ALLEN  
 DATE DRILLED: 06-09-1983  
 GROUND SURFACE ELEVATION: 1746.00 T  
 TOTAL DRILL HOLE DEPTH: 33.0  
 WATER RIGHTS WELL:  
 OTHER WELL NAME:  
 BASIN: BIG SIOUX  
 MANAGEMENT UNIT: ELKTON  
 SCREEN TYPE: PVC  
 CASING TYPE: PVC  
 CASING TOP ELEVATION: 1747.80 I  
 CASING STICK-UP: 1.30  
 WELL MAINTENANCE DATE: 06-09-1983  
 USGS HYDROLOGICAL UNIT CODE: 10170202  
 ELECTRIC LOG INFORMATION:  
 SPONTANEOUS POTENTIAL:  
 NATURAL GAMMA:  
 SAMPLES:

DRILLER'S LOG:  
 GEOLOGIST'S LOG: X  
 DRILLING METHOD: AUGER  
 TEST HOLE NUMBER: A1-83-11  
 SDGS WELL NAME: A1-83-11  
 AQUIFER: BIG SIOUX  
 SCREEN LENGTH: 5.0  
 CASING DIAMETER: 2.0  
 TOTAL CASING AND SCREEN: 23.0  
 SINGLE POINT RESISTIVITY:  
 EXTRA:

0	-	10.0	CLAY, BLACK, SILTY; MOIST (TOPSOIL)
10.0	-	12.0	SAND, BROWN, VERY COARSE, SILTY, CLAYEY; OXIDIZED, MOIST
12.0	-	24.0	SAND, BROWN, VERY COARSE, SILTY, CLAYEY; OXIDIZED, SATURATED
24.0	-	33.0	CLAY, GRAY, SILTY, SANDY, PEBBLY; UNOXIDIZED, MOIST (TILL)

\* \* \* \*

COUNTY: BROOKINGS  
 MAP LOCATION: 24  
 LEGAL LOCATION: NE SW NW SW SEC. 21, T. 109 N., R. 47 W.  
 LATITUDE: 44.1348  
 LAND OWNER:  
 PROJECT: ELKTON CITY STUDY  
 DRILLING COMPANY: SDGS  
 DRILLER: L. THOMAS  
 GEOLOGIST: J. ALLEN  
 DATE DRILLED: 06-10-1983  
 GROUND SURFACE ELEVATION: 1737.00 T  
 TOTAL DRILL HOLE DEPTH: 38.0  
 WATER RIGHTS WELL:  
 OTHER WELL NAME:  
 BASIN: BIG SIOUX  
 MANAGEMENT UNIT: ELKTON  
 SCREEN TYPE: PVC  
 CASING TYPE: PVC  
 CASING TOP ELEVATION: 1739.05 I  
 CASING STICK-UP: 1.20  
 WELL MAINTENANCE DATE: 06-10-1983

LOCATION: 109N-47W-21CBCA  
 LONGITUDE: 96.2903  
 DRILLER'S LOG:  
 GEOLOGIST'S LOG: X  
 DRILLING METHOD: AUGER  
 TEST HOLE NUMBER: A1-83-15  
 SDGS WELL NAME: A1-83-15  
 AQUIFER: BIG SIOUX  
 SCREEN LENGTH: 5.0  
 CASING DIAMETER: 2.0  
 TOTAL CASING AND SCREEN:

USGS HYDROLOGICAL UNIT CODE: 10170202

ELECTRIC LOG INFORMATION:

SPONTANEOUS POTENTIAL:

SINGLE POINT RESISTIVITY:

NATURAL GAMMA:

EXTRA:

SAMPLES:

0	-	5.0	SILT, DARK-BROWN, CLAYEY; MOIST (TOPSOIL)
5.0	-	15.0	GRAVEL, LIGHT-BROWN, SANDY, CLAYEY; OXIDIZED, DRY
15.0	-	30.0	GRAVEL, LIGHT-BROWN, SANDY, CLAYEY; OXIDIZED, SATURATED
30.0	-	38.0	CLAY, BROWNISH-GRAY, SILTY, SANDY, PEBBLY (TILL)

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