STATE OF SOUTH DAKOTA
Ralph Herseth, Governor

STATE GEOLOGICAL SURVEY
Allen F. Agnew, State Geologist

SPECIAL REPORT 5

GEOLOGY AND GROUND WATER RESOURCES AT ETHAN, SOUTH DAKOTA

by

Donald G. Jorgensen

UNION BUILDING
UNIVERSITY OF SOUTH DAKOTA
VERMILLION, SOUTH DAKOTA
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INTRODUCTION

Present Investigation

This report is the result of a request by the city of Ethan, and contains the results of a special investigation by the South Dakota State Geological Survey in and around Ethan for the purpose of locating a water supply for the city. Ethan now receives its water from the "wash" and/or the sandstones of the Dakota Group. The water is of poor quality, and the quantity of water is not adequate because of the poor condition of the present city well. Therefore the city wished to construct a new well which will yield water of adequate quantity and of better quality than the present well.

A reconnaissance geological survey was made during the summer and fall of 1959 of an area of approximately 20 square miles within a 2½-mile radius of Ethan. Besides the reconnaissance mapping, 14 test holes were drilled, water from many wells was sampled and analyzed, a well inventory was made, and a resistivity survey was run during which 82 stations were occupied.

The field work and the preparation of this report were performed under the supervision of Merlin J. Tipton for the South Dakota State Geological Survey. The successful completion of the investigation was benefited by the cooperation of Mayor Henry Oster and the residents of the Ethan area.

Location and Extent of Area

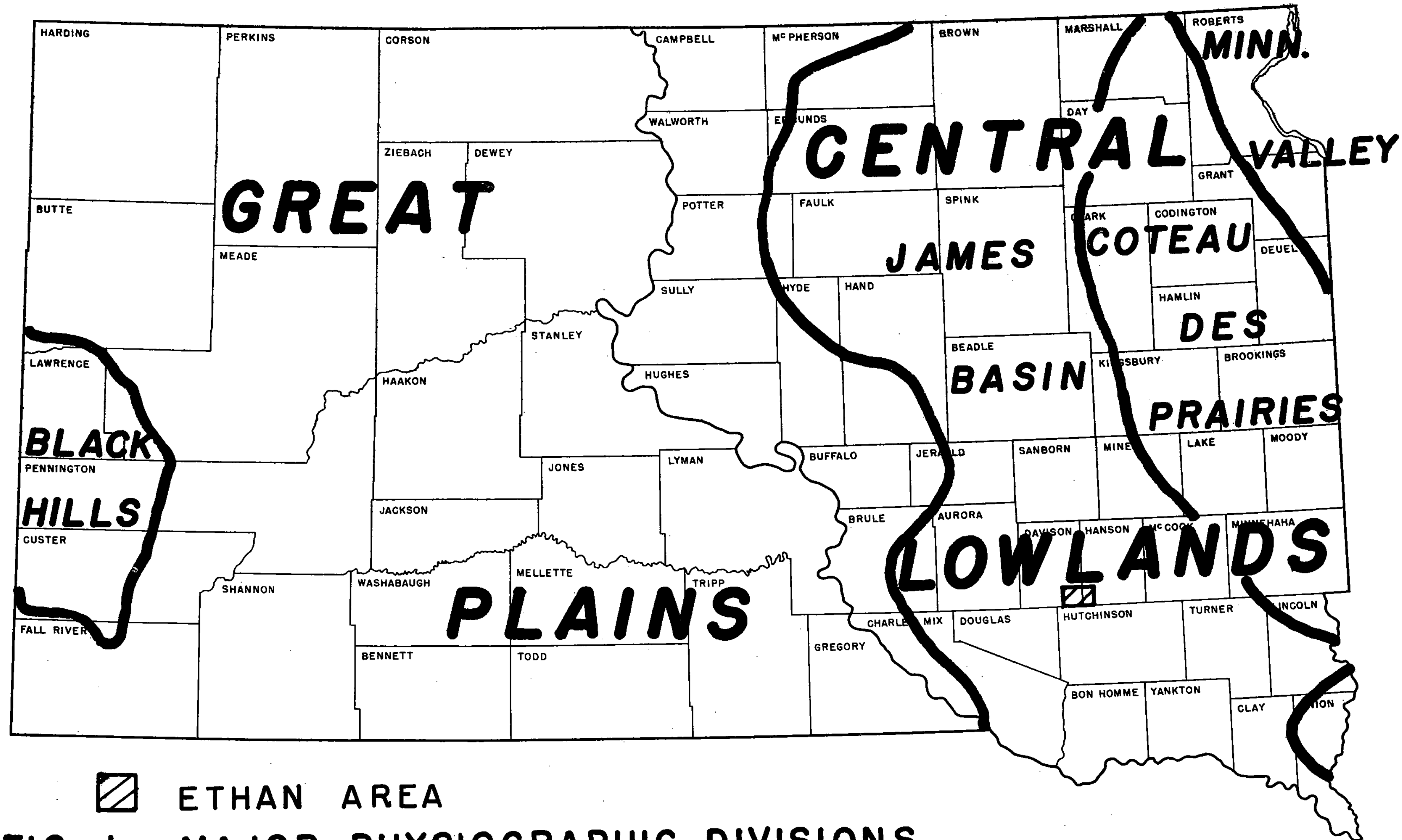
Ethan has a population of approximately 320 and is located in southeastern Davison County in east-central South Dakota. The area is in the James Basin of the Central Lowlands physiographic province, west of the Prairie Hills and east of the Missouri Hills (fig. 1).

Climate

The climate is typical continental with large daily and seasonal changes. The mean annual temperature for the area (Mitchell Station, U. S. Weather Bureau) is 47.15° F for the years 1940-1958, and the average yearly precipitation for the same period is 21.93 inches (fig. 2).

Topography and Drainage

The topography of the area consists of gently undulating hills with less than 30 feet of relief except for the narrow flat floodplain along Twelve Mile Creek.



ETHAN AREA

FIG. 1 MAJOR PHYSIOGRAPHIC DIVISIONS OF SOUTH DAKOTA (Rothrock, 1943)

SCALE
0 12 24 48 MILES

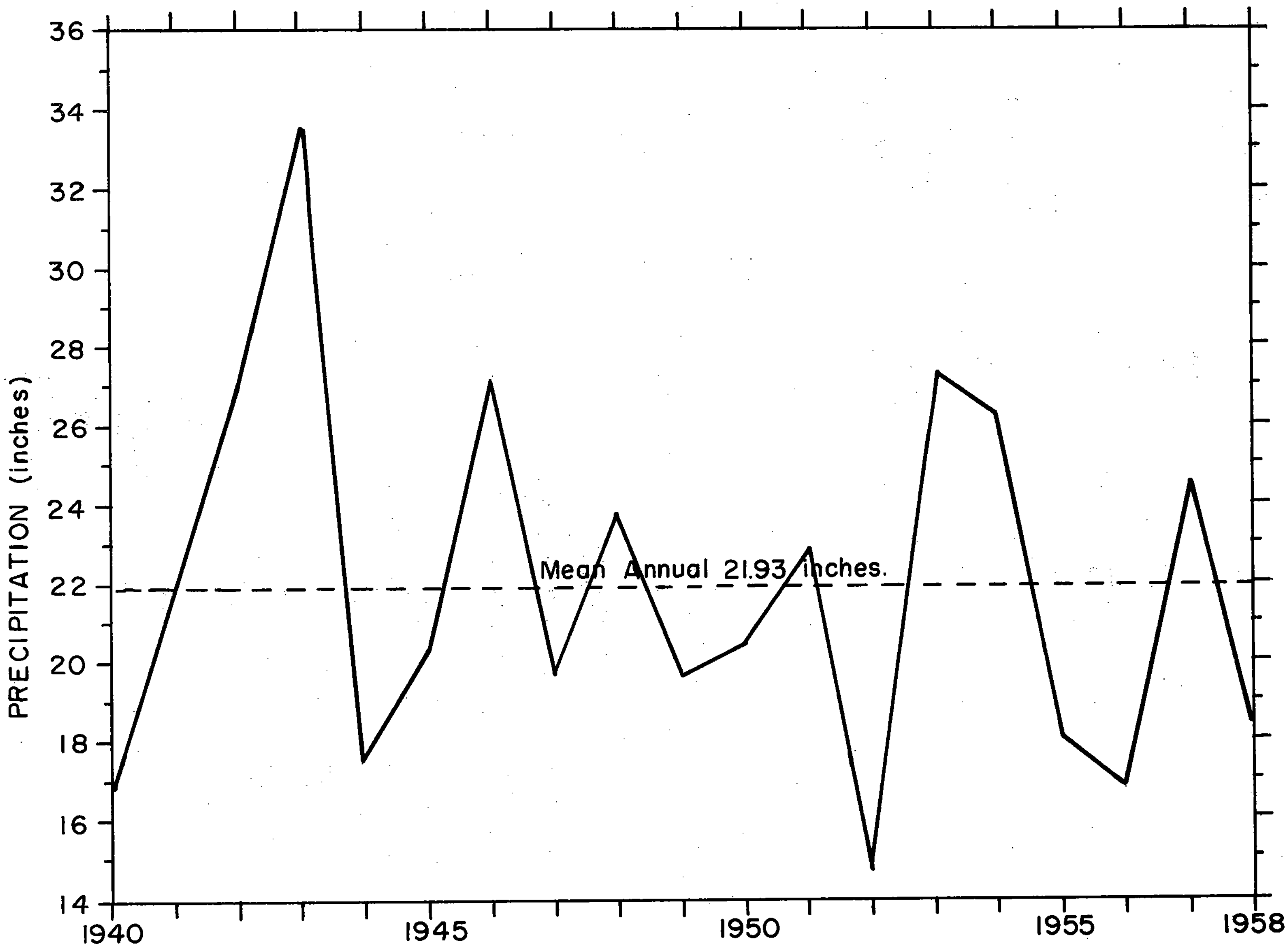


Figure 2 ANNUAL PRECIPITATION OF ETHAN AREA (MITCHELL), 1940–1958

GENERAL GEOLOGY

Surficial Deposits

Nearly all the surface of the Ethan area is covered with glacial drift (fig. 3). The glacial drift of the Ethan area was deposited by the Cary ice sheet late in the Pleistocene Epoch. Drift is the term used to describe material derived in any manner from the process of glaciation. Drift can be divided into outwash deposits and till.

Outwash material is the stratified portion of glacial drift and is composed of sand and gravel from glacial meltwater streams. The outwash sand and gravel northwest of Ethan are shown in Figure 4 by resistivity values, especially those values greater than 8000 ohm-cm.

Till is unstratified glacial drift which is carried by the ice itself and is composed of boulders, pebbles, sand, silt, and clay.

The end moraine and the ground moraine of the Ethan area are composed of till (fig. 3). Ground moraine is moraine with low relief formed by ice movement and the deposition of till during the melting and evaporation of the ice. End moraine is a ridgelike accumulation of material deposited at the margins of the ice sheet. The city of Ethan is situated on an end moraine.

Alluvium is present in a narrow belt along Twelve Mile Creek and along some of the smaller tributary creeks. Alluvium is material deposited by streams and in the Ethan area consists of clay, silt, and fine sand.

Subsurface Deposits

Stratified sedimentary rocks are found beneath the unconsolidated surficial deposits of drift and alluvium. The stratified rocks present beneath the Ethan area are in descending order the Niobrara chalk, the Carlile shale, the Greenhorn limestone, the Graneros shale, and the Sioux quartzitic sandstone. All the formations are of Cretaceous age except the Sioux Formation, which is Precambrian in age.

The Niobrara Formation, blue-gray calcareous chalk and marl, is present beneath the surficial deposits except where it has been removed by erosion. The Niobrara chalk (Kn) is exposed along Twelve Mile Creek (fig. 3) where it has been weathered to a buff-white.

The Carlile shale (Kc), which is also exposed along Twelve Mile Creek, is a medium- to dark-gray shale with abundant pyrite concretions and aragonite fragments; near its top is the Codell sandstone which consists of approximately 30 feet of fine-grained sandstone with thin shale partings. Locally sandstone layers are cemented with silica and/ or pyrite, thus forming hard "shells".

The Greenhorn limestone is a brown to medium-gray sandy limestone, locally cemented with pyrite.

The Graneros Formation is 20-50 feet thick in the Ethan area, and consists of a medium-gray shale interbedded with thin layers of siltstone and sandstone; at Ethan it lies directly above the Sioux quartzitic sandstone. The Graneros Formation at Ethan is composed of shale, sandstone, and fragments from the underlying Sioux Formation. The mixture of sand from the Sioux Formation, and the sand and shale from the overlying Graneros is termed "wash".

The Dakota Group of eastern South Dakota consists of sandstone layers separated by a medium- and dark-gray shale beds. However, the Dakota sandstones and shales are not present beneath the city of Ethan.

The Sioux Formation consists largely of quartzitic sandstone tightly cemented with silica and is called "quartzite" or sometimes "pink granite".

SOUTH DAKOTA GEOLOGICAL SURVEY
ALLEN F. AGNEW, STATE GEOLOGIST

GEOLOGIC MAP OF THE ETHAN AREA

STATE OF SOUTH DAKOTA
RALPH HERSETH, GOVERNOR

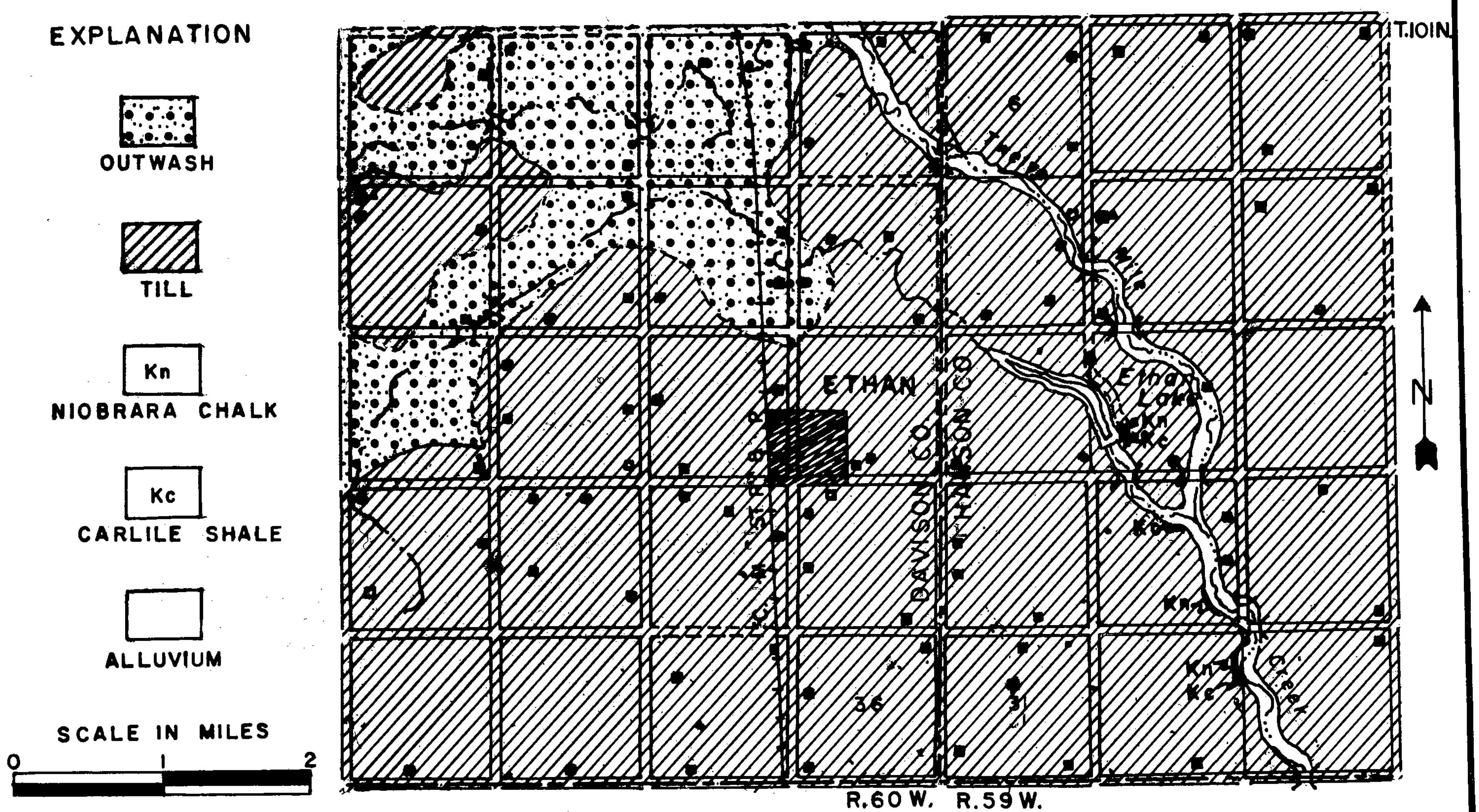
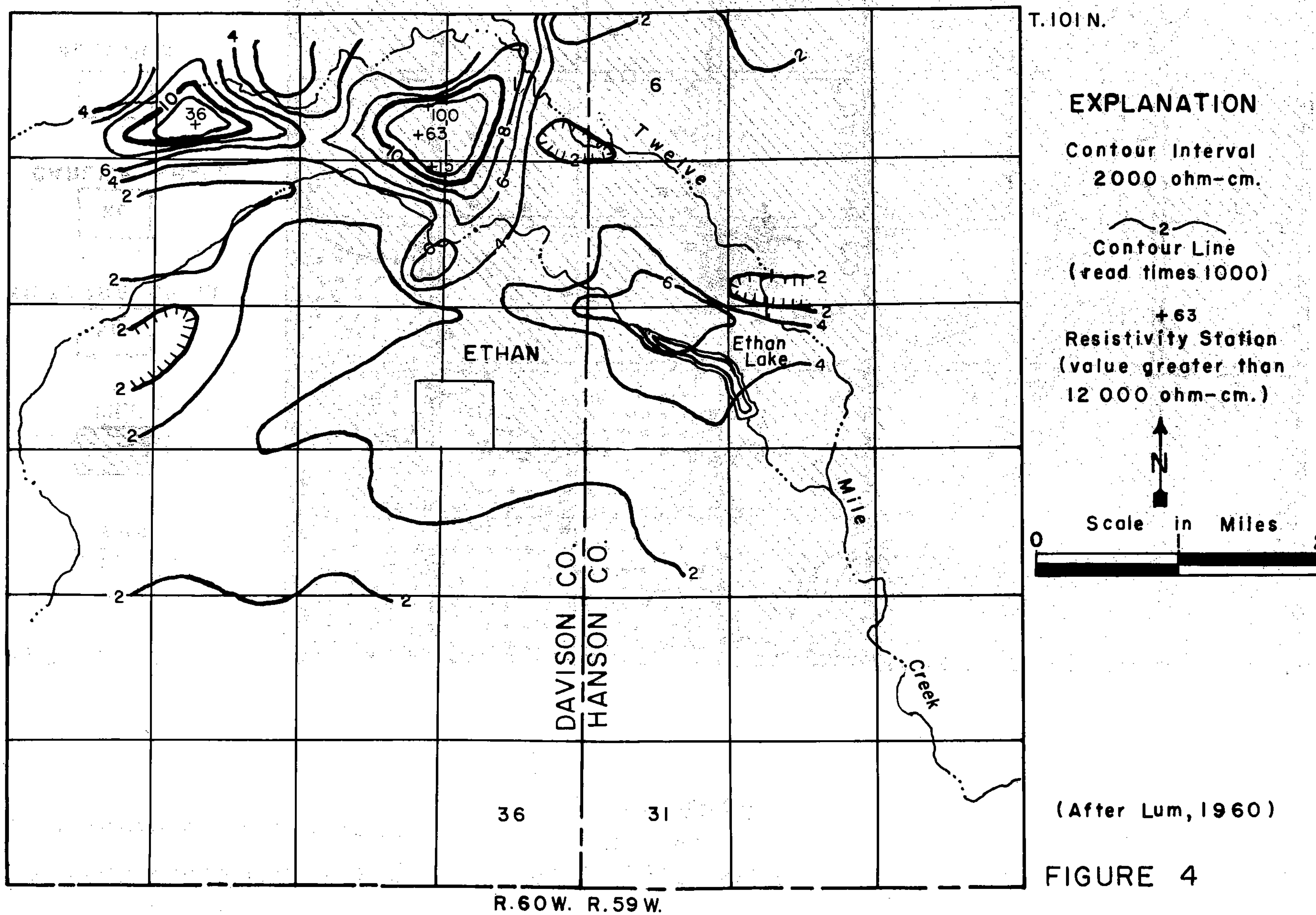


FIGURE 3

ISO-RESISTIVITY CONTOUR MAP of the ETHAN AREA



(After Lum, 1960)

FIGURE 4

OCCURRENCE OF GROUND WATER

Principles of Occurrence of Ground Water

Nearly all ground water is derived from precipitation. Rain or melting snow either percolates directly downward to the water table or drains off as surface water. Surface water will either evaporate, escape to the ocean, or if the surface water has a higher water level than the surrounding ground it will percolate downward to the ground water table. In general, ground water flows downward from the ground surface to the water table or piezometric surface, and then laterally down the hydraulic gradient. If the water is moving down the hydraulic gradient, it is said to be in transient storage. Therefore recharge or the addition of water to an aquifer (water-yielding material) is accomplished in 3 main ways:

1. Direct percolation derived from rain or melting snow.
2. Percolation from surface bodies of water.
3. Underflow or water in transient storage.

Discharge or the removal of ground water is accomplished in 4 main ways:

1. Evaporation and transpiration by plants.
2. Seepage into surface bodies of water and springs.
3. Underflow or water in transient storage.
4. Pumping of water.

The volume of water capable of being stored in a saturated material is equal to the volume of the voids or pore space of the material. A measurement of the capability of a material to store water is called porosity. Porosity is the ratio of the volume of voids in the rock to the rock volume. The shape and arrangement of grains in a rock affects the porosity greatly, but size has no effect. Therefore a container filled with sand would hold the same quantity of water as the same container filled with gravel, if the sand and gravel had the same shape and packing. Natural gravels and sands generally have porosities of 20-40 per cent. Sandstones have porosities of about 20 per cent; the lower porosity is due to closer packing common in sandstones.

The ratio of water volume that will drain from a material by gravity, to the volume of the material, is called specific yield. In general the smaller the particle size and correspondingly the smaller the pore spaces, the greater the attraction of the water to the pore walls, thus decreasing the specific yield. Values for specific yield vary from zero for plastic clays to nearly the value of the porosity for coarse gravels and sands.

The rate that water will drain or pass through a material is a function of the permeability of the substance. The nature of the system of pores, rather than their volume, controls the ease of which water will pass through a substance. Water will pass through a material with interconnected pores, but will not pass through a material with unconnected pores even if the latter has a higher porosity. Therefore permeability and porosity are not synonymous terms. An example is glacial till, which has a high porosity but will yield little water because it is relatively impermeable.

If a water-bearing formation dips below an impervious layer, the water becomes confined as in a pipe, and will seek to regain its normal water level because of hydrostatic pressure. Water confined in this manner is under artesian pressure.

Ground Water in Glacial Outwash Deposits

Glacial sands and gravels are excellent ground water aquifers because they are permeable and possess high porosity. Unfortunately the outwash deposits in the mapped area (fig. 3) are not excellent water reservoirs because they are shallow, and the lowering of the water table in dry years may result in the depletion of the ground water. However, outwash deposits just north of the mapped area (Hoff and Wong, 1960; Wong, 1960) are well below the water table and are therefore good ground water reservoirs.

Ground Water in Glacial Till

Till has a high porosity but low permeability, and therefore yields water very slowly.

Locally, stratified sand lenses are found in till. A stratified sand lens will yield water very rapidly for a short period of time, but will not yield enough water for a city because of its limited volume and because it depends upon the till for recharge.

Ground Water in Alluvium

The alluvium found in Twelve Mile Creek holds a large quantity of water but because it consists predominantly of clay which is relatively impermeable, it will yield water slowly.

Ground Water in the Codell Sandstone

The Codell sandstone is a zone of sand and clay layers near the top of the Carlile Formation. The sand layers consist of well-sorted fine- to coarse-grained (table 1) angular to subangular quartz sand. The Codell Member is approximately 30 feet thick, of which approximately half consists of sandstone. At some locations in Ethan, however, the Codell consists predominantly of shale with only a few small sand lenses.

Table 1.--Size Analyses of Samples from the Codell Sandstone

Sample* Number	(Sieve openings in inches) Cumulative Percent of Sample Retained on Each Screen					
	.0787	.0394	.0197	.0098	.0049	.0024
1	0	2.25	2.70	26.50	93.95	97.65
2	0	0.35	1.25	13.15	88.35	97.75
3	0	0	2.75	29.35	95.75	99.00
4	0	0	0.25	26.45	93.75	98.15
5	0	0	1.50	23.75	96.25	98.05

*Samples were taken at 5-foot intervals from top to bottom of exposed section of Codell sandstone in SE¼SE¼ sec. 18, T. 102 N., R. 59 W., Hanson County, South Dakota, about 7 miles north of Ethan.

The sandstone layers are porous and permeable, and form artesian aquifers except where they are cemented with silica and pyrite.

The source of water or the recharge for the Codell sandstone is largely from the buried Sioux Ridge, to the north.

Discharge of water in the area is due to pumping and springs. Water wells in the Codell yield adequate water for domestic and stock uses, but not enough water for a city supply. Other thin discontinuous sand lenses occur locally in the Carlile Formation, but they yield very small quantities of water.

Ground Water in the "Wash"

The sandstone zones of the Dakota Group are artesian ground water aquifers. These sandstones are similar in character to those of the Codell but are thicker and yield larger quantities of water. At Ethan the Dakota is missing because it has been truncated against the surface of the buried Sioux "Quartzite" ridge west of town.

At nearly all places where the Dakota or Graneros lie directly on the quartzitic sandstone, there is a 10- to 20-foot layer of "wash". The "wash" consists of a mixture of overlying sediments and rock fragments eroded from the underlying quartzitic sandstone. The "wash" is water-bearing and receives its water from the sandstones of the Dakota, present a short distance to the south; the artesian pressure of this water permits it to move up-dip to the "wash" in the Ethan area.

The recharge of water for the sandstone layers and the "wash" is thought to be derived from the Black Hills and/or Rocky Mountains where the Dakota or its lateral equivalents crop out at a higher elevation.

Discharge of water is accomplished by pumping, flowing wells, and springs.

QUALITY OF GROUND WATER

Principles of Ground Water Quality

Meteoric or precipitated water is nearly pure before it reaches the ground. After the precipitated water reaches the ground it comes in contact with many minerals, some of which are more soluble in water than others. Therefore it can be seen that the mineral content of the water depends upon the time and the solubility of the minerals with which the water comes in contact.

Quality of Outwash Water

No analysis was made of the water in the outwash deposits of the mapped area because they were determined to be an unsuitable reservoir for the city water supply. However the outwash water is used locally for stock and is used extensively north of the mapped area for domestic and stock purposes.

Quality of Till Water

The quality of the till water is apparently adequate for domestic and stock use. An analysis of till water was not made because the stratified sand lenses in the till will not yield enough water for the city of Ethan.

Quality of Alluvial Water

Very few wells draw water from the alluvial reservoir in the Ethan area. The water is used for domestic and stock purposes. An analysis was not made of water from the alluvial reservoir because the aquifer probably would not yield adequate quantities for the city, and because of the distance of the aquifer from Ethan.

Quality of Codell Water

The Codell water is probably suitable for public water supply (table 2) for the city of Ethan, although it possesses a higher total solid content than is desirable (table 3). The large total solid content is due partially to high concentrations of sulfates and sodium. The water is considered "soft", with hardness ranging from 89 to 363 ppm. Water from a thin sand lens similar to the Codell sandstone was analyzed and found to be of poor quality (table 2).

Quality of "Wash" Water

The "wash" water is of poorer quality than the water derived from the Codell sandstone. The "wash" water contains a high concentration of calcium, sulfates, and has a high total mineral content. However, the high concentration of sulfates is partially counteracted by the high calcium concentration; therefore the water is less harmful to plants than the high sulfate concentration would indicate. The water is considered to be "hard" and therefore consumption of soaps and detergents is high.

Table 2. -- Water Analyses

Sample Number	Source of Water	Total Solids	Chlorine (Cl)	Calcium (Ca)	Iron (Fe)	Sodium (Na)	Magnesium (Mg)	Fluoride (F)	Manganese (Mn)	Alkalinity: Phenophthalein	Alkalinity: Methyl Orange	Sulfate (SO_4)	Hardness	Class for Irrigation
1	Codell Sandstone	1618	78	52	0	428	11	0	0	34	215	768	175	III
2	"Wash"	2308	110	410	0	100	83	0	0	--	51	1314	1364*	II
3	Codell Sandstone	1528	101	37	0	476	0	0	0	60	373	629	89	III
4	Sand Lense in Carlile Formation	2344	150	400	tr	123	80	0	tr	--	56	1290	1329	II
5	Codell Sandstone	1748	70	103	0	328	26	0	0	22	155	842	363	III
6	"Wash"	2372	141	333	0	75	74	0	0	20	133	1253	1259	II
7	"Wash"	2100	94	277	10.4	216	69	1.4	tr	0	126	1205	994	II

*Hardness

Location

1. Rose Vikers SE¼NE¼ sec. 19, T. 101 N., R. 59 W., Hanson County, South Dakota
2. Art Schlaffman SE¼NE¼ sec. 23, T. 101 N., R. 60 W., Davison County, South Dakota
3. Bainbridge Bros. SE¼SE¼ sec. 7, T. 101 N., R. 60 W., Davison County, South Dakota
4. Bob Tobin SE¼SW¼ sec. 13, T. 101 N., R. 60 W., Davison County, South Dakota
5. Letichner SW¼SW¼ sec. 13, T. 101 N., R. 60 W., Davison County, South Dakota
6. Ethan (old well) at Ethan, Davison County, South Dakota
7. Ethan (new well) at Ethan, Davison County, South Dakota

Samples analyzed by D. J. Mitchell, State Chemist, State Chemical Laboratory, Vermillion, South Dakota. 1959, except sample 7 was analyzed by F. Fliginer, State Department of Health, Pierre, South Dakota, 1960.

Table 3.--United States Public Health Service Standards for Drinking Water (1946)

Constituent	Standard Limits (ppm)
Copper (Cu)	3.0
Iron and Manganese (Fe) and (Mn) together	0.3
Magnesium	125
Zinc (Zn)	15
Chloride (Cl)	250
Sulfate (SO_4)	250
Lead (Pb)	0.1
Fluoride (F)	1.5
Nitrate (NO_3)	10.0
Arsenic (As)	0.05
Selenium (Se)	0.05
Hexavalent Chromium (Cr)	0.05
Phenolic Compounds	0.001
Total Solids	500*

*Total Solids may exceed 500 ppm to a maximum of 1000 ppm if the water having this concentration is the only water available.

CONCLUSIONS AND RECOMMENDATIONS

Only two sources of ground water are practical for the city water supply, the Codell sandstone and the "wash".

A new well drilled into the "wash" and properly constructed could yield an adequate quantity of water for the city, but probably the water would be similar in quality to the present city water.

The Codell sandstone yields water of better quality than the "wash" but probably not as large a quantity. The quantity of the water that could be obtained cannot be determined with accuracy unless a pump test is conducted. Because of the good quality of the water in the Codell sandstone and the shallow depth at which it occurs (90-140 feet) beneath the city, it would seem desirable to test this sand. It is suggested that a large-diameter hole be drilled and that samples be taken at 5-foot intervals until the sand is encountered, and then 1-2 foot samples of the entire sand and shale section. These samples should be analyzed particularly for grain size and amount of cement. The size analysis will indicate the type of well screen to be used, and the size of the gravel to be used if a gravel pack is necessary. If the total thickness of water-bearing sands is large, it is recommended that the entire sand and shale section be screened and gravel-packed. Generally it is not necessary to screen the entire water-bearing aquifer, but because the sand layers are thin and each is water-bearing, a larger quantity of water will be obtained if all or nearly all the sand layers are screened. If the cost is prohibitive to screen the entire sand and shale section, then the sandstone sections only could be screened, but the entire sand-shale section should be gravel-packed.

Water in adequate quantity and quality could be obtained from the outwash deposits about 4 miles north of Ethan. Although the pipeline expense will be great, the city would be assured of an adequate water supply.

The city should obtain a water permit from the State Water Resources Commission, and contact the State Board of Health as to the chemical and biological suitability of the water. It is recommended that the city contract a commercial well driller licensed by the State of South Dakota to do further test drilling, to find the most favorable site for a well or wells.

DATA MAP OF THE ETHAN AREA

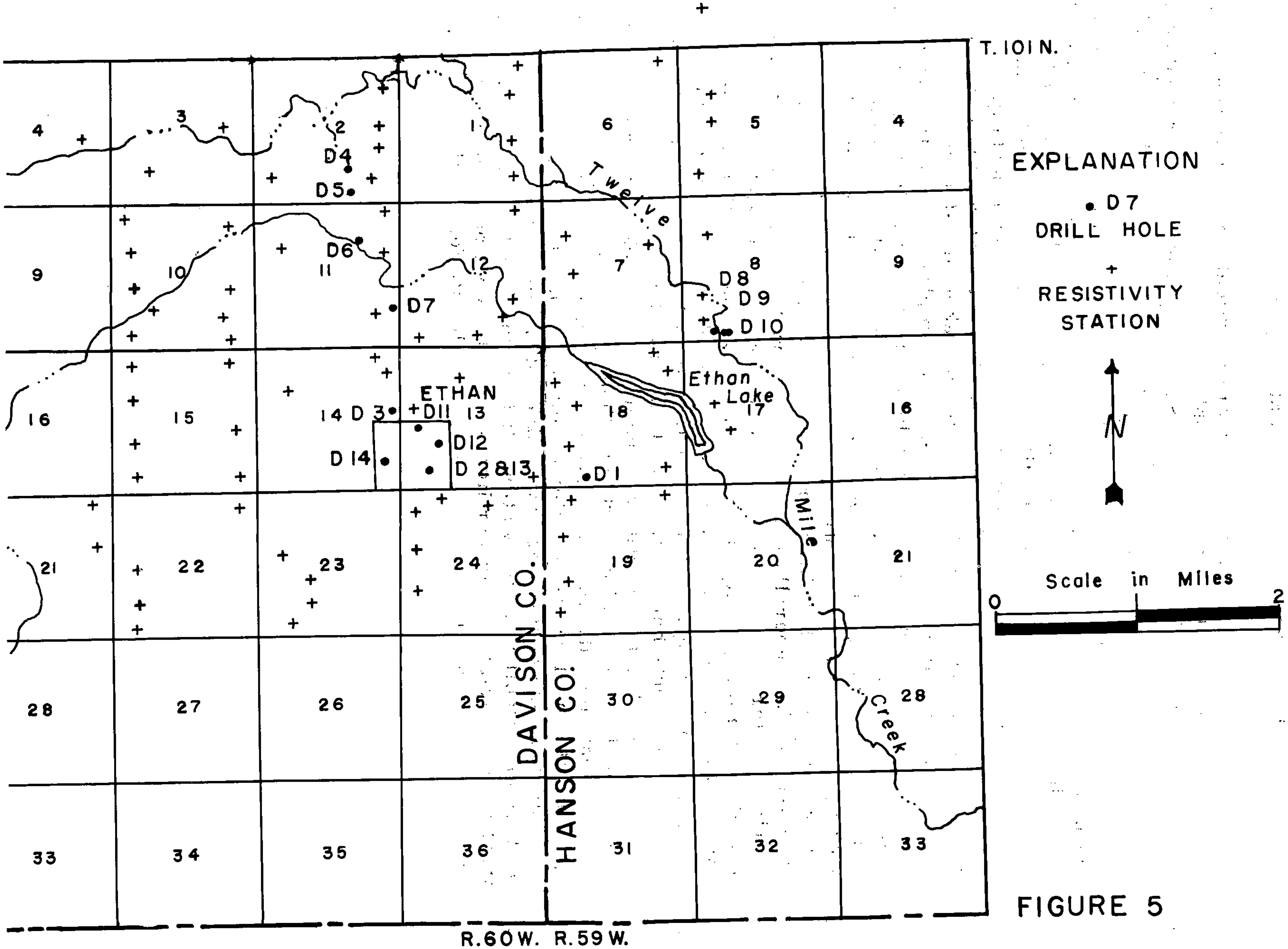


FIGURE 5

APPENDIX A (fig. 5)

Logs of South Dakota Geological Survey Test Holes

D-1

Location: SE¼SW¼ sec. 18, T. 101 N., R. 59 W., Hanson County
Elevation: 1330 ± 5 feet
Total depth: 67 feet
Depth to water: 40 feet

Description	Depth (feet)
Clay	0-14
Clay, oxidized	14-19
Clay, gray	19-29
Clay, gray, with sand and pebbles	29-39
Shale, dark gray with fine sand	39-67

D-2

Location: SW¼SW¼ sec. 13, T. 101 N., R. 60 W., Davison County (at Ethan)
Elevation: 1340 feet
Total depth: 88 feet
Depth to water: 24 feet

Description	Depth (feet)
Clay, dark gray	0- 4
Clay, brown	4-24
Clay, oxidized, silt	24-26
Shale, blue gray, with silt	26-88

D-3

Location: NE¼SE¼ sec. 14, T. 102 N., R. 59 W., Davison County
Elevation: 1334 feet
Total depth: 68 feet
Depth to water: 17 feet

Description	Depth (feet)
Clay, brown	0-15
Shale, medium gray, with silt and sand	15-68

D-4

Location: NW¼SE¼ sec. 2, T. 102 N., R. 59 W., Davison County
Elevation: 1326 feet
Total depth: 13 feet
Depth to water: _____

Description	Depth (feet)
Sand, fine-grained	0- 4
Sand with gravel	4- 8
Clay	8-13

D-5

Location: SW¼SE¼ sec. 2, T. 102 N., R. 59 W., Davison County
Elevation: 1336 feet
Total depth: 47 feet
Depth to water: 23 feet

Description	Depth (feet)
Clay, gray	0- 5
Sand and silt	5- 7
Sand, medium to coarse-grained	7-19
Gravel, small	19-23
Shale, gray	23-47

D-6

Location: SW¼NE¼ sec. 11, T. 101 N., R. 60 W., Davison County
Elevation: 1338 feet
Total depth: 33 feet
Depth to water: _____

Description	Depth (feet)
Clay, dark gray	0- 4
Silt with medium-grained sand	4- 8
Sand, medium- to coarse-grained	8-13
Sand, coarse	13-18
Gravel and sand	18-23
Shale, dark gray	23-33

D-7

Location: NE¼SE¼ sec. 11, T. 102 N., R. 59 W., Davison County
Elevation: 1330 feet
Total depth: 48 feet
Depth to water: 12 feet

Description	Depth (feet)
Clay, dark gray	0- 4
Sand	4- 9
Sand and clay	9-12
Shale, dark gray	12-48

D-8

Location: SW¼SW¼ sec. 8, T. 101 N., R. 59 W., Hanson County
Elevation: 1295 feet
Total depth: 33 feet
Depth to water: 10 feet

Description	Depth (feet)
Clay, dark gray	0- 4
Clay with sand	4- 8
Clay, gray	8-29
Shale, dark gray	29-33

D-9

Location: SE¼SW¼ sec. 8, T. 101 N., R. 59 W., Hanson County
Elevation: 1295 feet
Total depth: 47 feet
Depth to water: 10 feet

Description	Depth (feet)
Clay, gray with silt and sand	0- 9
Clay, dark gray (shale?)	9-24
Shale, dark gray	24-47

D-10

Location: SE¼SW¼ sec. 8, T. 101 N., R. 59 W., Hanson County
Elevation: 1295 feet
Total depth: 48 feet
Depth to water: 29 feet

Description	Depth (feet)
Clay, medium gray	0- 9
Shale, dark gray with fine sand	9-29
Shale, dark gray	29-48

D-11

Location: (North edge of Ethan, 1 block east of old State Route 37)
NW¼SW¼ sec. 13, T. 101 N., R. 60 W., Davison County
Elevation: 1337 feet
Total depth: 91 feet
Depth to water: 21 feet

Description	Depth (feet)
Clay, medium gray	0- 4
Marl, light yellow, calcareous (Niobrara?)	4-21
Shale, dark gray (Carlile) with fine sand	21-91

(The hole abandoned because the drill encountered a cemented sandstone bed at 91 feet).

D-12

Location: (West edge of Ethan, about 1 block east of U.S. Gov't grain bins)
NE¼SW¼ sec. 13, T. 101 N., R. 60 W., Davison County
Elevation: 1337 feet
Total depth: 69 feet
Depth to water: 20 feet

Description	Depth (feet)
Clay, yellowish tan	0- 9
Sand and clay	9-14
Sand	14-19
Shale, dark gray	19-64

D-13

Location: (in Ethan at H. Oster residence) SW¼SW¼ sec. 13, T. 101 N.,
R. 60 W., Davison County
Elevation: 1340 feet
Total depth: 75 feet
Depth to water: 12 feet

Description	Depth (feet)
Clay, medium gray	0- 4
Clay, yellow tan with rock fragments (till)	4-24
Shale, dark gray	24-75

(Drill encountered cemented sandstone bed and had to abandon the hole).

D-14

Location: (3/4 block north of lumber yard at Ethan) SE¼SE¼ sec. 14, T. 101 N., R. 60 W., Davison County
Elevation: 1342 ± 7 feet
Total depth: 109 feet
Depth to water: 29 feet

Description	Depth (feet)
Clay, gray with rock fragments (till)	0- 8
Clay, yellow (Niobrara?)	8- 19
Shale, dark gray	19- 87
Sandstone, fine-grained cemented	87- 89
Sandstone, fine-grained, loosely consolidated and dark gray shale beds, sandstone contains water under slight artesian pressure	89-106
Sandstone, fine-grained, well-cemented	106-109

APPENDIX B

Log of Ethan City Well (new)

Ethan City Well
Davison County, S. Dak.
Elevation: 1345 (topo. map)
Total depth: 320 feet
Driller - Hertz Drilling Co.
Logged by M. J. Tipton, Dec., 1959

Depth (feet)	Description
0-150	no samples
150-155	Shale, dark gray mixed with fine sand and clay. Some fine sand size pyrite and a few mica flakes.
155-165	no samples
165-180	Shale, light gray, greasy, tends to ball up, with pyrite disseminated throughout. Some calcite and a few Inoceramus prisms.
180-190	no samples
190-195	Shale, dark gray, flaky, with some pyrite and selenite. Few pieces fine sandstone, slightly glauconitic. Few pieces dark to light brown siltstone. One sharks tooth.
195-215	no samples
215-220	same as above
220-235	no sample
235-240	same as above with some loose fine sand.
240-255	no sample
255-260	same as above
260-265	no sample
265-270	Shale, med. gray with occasional white specks.
270-275	no sample
275-280	same as above
280-285	no sample
	Greenhorn Formation (E-log top 288)
285-290	Limestone, cream colored, sucrose, with numerous broken shells and Inoceramus prisms. Much dark gray shale as above.

290-315 no sample

Sioux quartzite wash (?) (E-log top 296)

315-320 Sand, fine to coarse, mostly pink quartz, subangular, loose, mixed with some dark shale, limestone, and pyrite.

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About the South Dakota State Geological Survey

The South Dakota Geological Survey is a research and public service agency for the State of South Dakota. Since 1893 the State Geologist has been authorized to "make an actual geological survey of the lands, and earth, and the area beneath the surface of the lands....." of the State. The purpose of the State Geological Survey is to conduct field and laboratory studies of South Dakota's geology and mineral deposits, which are the metals and non-metals, the mineral fuels including oil and gas, and ground water. The results of these studies are published in reports such as this.

The work of the State Geological Survey is continuous -- its research and services are adjusted to the changing economy in order to serve South Dakota most effectively.

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