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DIVISION OF WATER RESOURCES

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GROUND-WATER RESOURCES OF NORTHWESTERN INDIANA

Preliminary Report: Starke County

Prepared by the

GEOLOGICAL SURVEY

UNITED STATES DEPARTMENT OF THE INTERIOR

In cooperation with the

DIVISION OF WATER RESOURCES

INDIANA DEPARTMENT OF CONSERVATION

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Donald E. Foltz, Director

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BY

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GEOLOGISTS, U. S. GEOLOGICAL SURVEY

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ABSTRACT

Starke County, in northwestern Indiana, has an area of about 313 square miles. Glaciofluvial sand and gravel of Pleistocene age is the chief source of ground water for domestic, stock, industrial, and public supplies. Wells that tap this source generally are less than 140 feet deep and yield from 5 to 1,600 gpm (gallons per minute). The underlying bedrock also is used as a source of ground water. The rocks of Middle Devonian age are the chief bedrock source and are used locally in the southwestern part of the county for domestic, stock, and public supplies. Wells that tap this source generally are less than 280 feet deep and yield as much as 850 gpm. Field chemical analyses show that the hardness of water from the glaciofluvial sand and gravel generally is greater than 60 and less than 400 ppm (parts per million). In much of the county the concentration of iron from this source does not exceed maxium concentration recommended in the U. S. Public Health Service drinking-water standard for iron and manganese together. However, this standard is exceeded in several broad areas in the county.

This preliminary report contains tabulated records of about 340 wells and test holes giving information about well construction, water level, condition of occurrence, and characteristics of water-bearing material; selected logs for about 100 wells and test holes giving driller's description of material penetrated and authors' interpretation of their geologic age; results of 186 field chemical analyses giving hardness of water and the bicarbonate, chloride, iron, and sulfate contents; and water levels in 10 observation wells indicating the magnitude of short-term and long-term waterlevel fluctuations in the unconsolidated rocks. These basic data include much of the material to be used in an interpretive report on the ground-water resources and geology of the area.

A base map of Starke County shows the location of each well or test hole listed in this report. Additional maps show the availability of ground water in the county and the areal distribution of hardness of water from the unconsolidated rocks of Pleistocene age.

INTRODUCTION

Purpose and Scope

An investigation of the ground-water resources and geology of 10 counties in northwestern Indiana has been in progress since June 1954. This investigation is being made by the U. S. Geological Survey in cooperation with the Division of Water Resources, Indiana Department of Conservation, as a part of a broad program of these agencies to inventory and evaluate the ground-water resources of Indiana.

This report is the seventh of a series of preliminary reports to be published on the ground-water resources and geology of northwestern Indiana. The purpose of the report is to make the basic data collected during the investigation available to the public and to provide a preliminary evaluation of the ground-water conditions and geology as an aid to development of ground-water resources. A more detailed and comprehensive analysis is in progress and will be published in an interpretive report on the ground-water resources and geology of the area.

The investigation was made under the immediate supervision of C. M. Roberts, district geologist for Indiana.

Location and Areal Extent

Starke County is in the northwestern part of Indiana (fig. 1). The county approximates a rectangle of which the northwestern part has been removed, leaving an irregularly shaped boundary. It includes about 313 square miles and is bounded on the north by La Porte and St. Joseph Counties, on the south by Pulaski County, on the west by Jasper and La Porte Counties, and on the east by Marshall County.

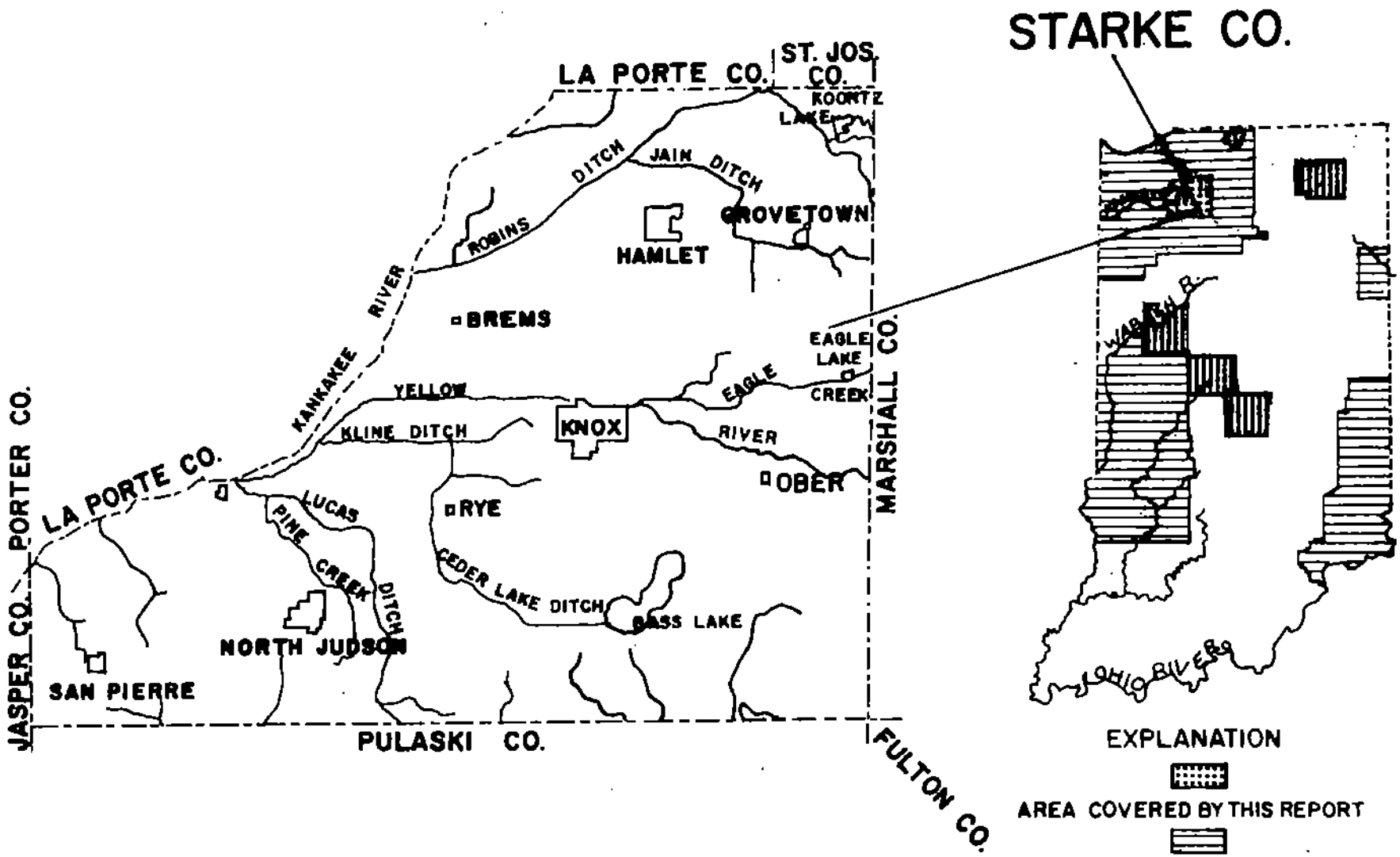

FIGURE 1. -- Map of Indiana, showing area covered by this report, areas under investigatigation, and areas covered by reports published under the cooperative program.

Well-Numbering System

A numbering system is used to locate and identify the wells and test holes in this report. The number that is assigned each well or test hole indicates its location according to the official rectangular public-land survey. For example, in the number for well 33/1W-25R1, the numbers preceding the hyphen indicate that the well is in T. 33 N., R. 1 W. The first number after the hyphen indicates the section in which the well is located. Each quarter-quarter section (40-acre tract) within a section is assigned a letter symbol as shown on figure 2. Within the quarter-quarter section the wells and test holes are numbered consecutively. Therefore, well 25R1 is the first well listed in SE¼SE¼ sec. 25, T. 33 N., R. 1 W.

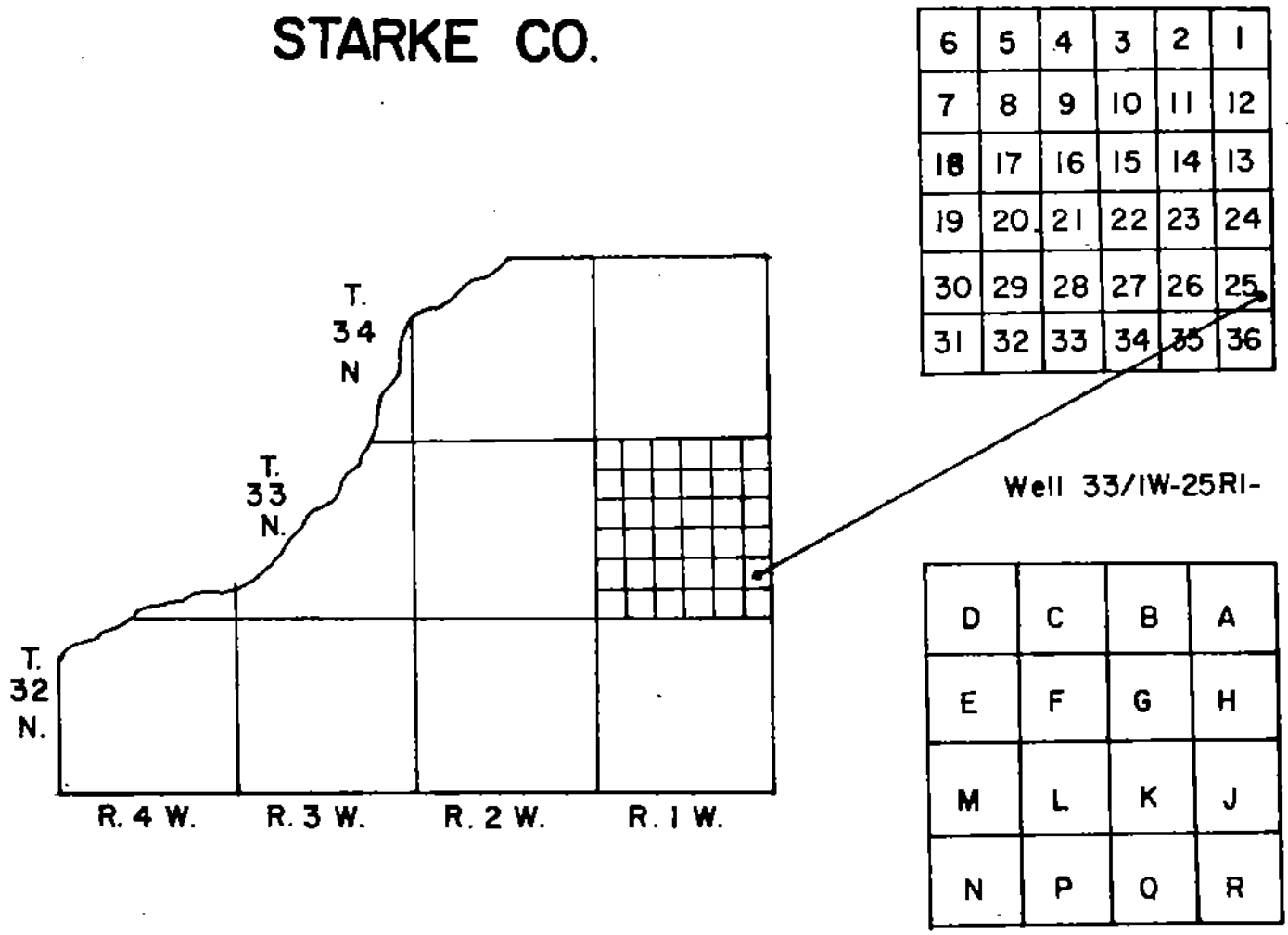

FIGURE 2.- Sketch showing well-numbering system.

Acknowledgments

The authors thank all persons who contributed time, information, and assistance during the collection, tabulation, and processing of data for this report. R. J. Vig, formerly of the Geological Survey, assisted in processing the data in the field. Well drillers, whose names are listed in the table of well records, furnished information summarized in tables 3 and 4.

The authors also thank the following government agencies which provided information for the report: Divisions of Oil and Gas and Water Resources, Indiana Department of Conservation; Indiana State Highway Department; Indiana State Board of Health; and U. S. Corps of Engineers.

DATA COLLECTION AND PROCESSING

The well data were collected principally from drillers, water-works superintendents, and owners. The well records obtained from the drillers were of two types--written records and reports from memory. Tentative driller's locations were checked against the property records in the County Courthouse to verify the location, to locate the property, and to obtain the name of the current property owner. The locations of wells were checked further in the field if major discrepancies existed between the reported location and the property record in the plat books, if the location given could not be verified from county records, or if the verified location was not sufficiently accurate to be used.

Plate 1 shows the location of water wells and test holes and test holes drilled for purposes other than water supply. Most of these locations are shown to the nearest 10 acres. The basic data for these wells and test holes are summarized in table 3. In addition, selected driller's logs of wells and test holes are given in table 4.

Samples of water were collected at the time well sites were visited. These water samples were analyzed in the field office for hardness of water and alkalinity (expressed as bicarbonate) and chloride and sulfate contents by standard titration methods. The iron content of the water was determined at the well site immediately after the sample was collected. A visual method was used to determine the iron concentration in parts per million by matching the color of the treated sample to that of a liquid-color standard having a known iron concentration. The results of the field chemical analyses (table 5) were used to select sites for collecting larger water samples for more comprehensive chemical analyses by the laboratory of the U. S. Geological Survey.

Observation wells were established prior to the investigation in order to obtain relative changes in storage in the ground-water reservoir. Table 6 contains the water-level data collected from these wells. The observation wells were chosen so as to obtain water-level information from artesian and water-table aquifers consisting of unconsolidated rocks. Wherever possible, the wells were established at sites where the factors affecting the water levels in the aquifer were due chiefly to natural causes.

GENERAL GEOLOGY AND SOURCES OF GROUND WATER

The oldest known consolidated rocks underlying Starke County are of Ordovician age. These rocks consist of dolomite, dolomitic limestone, and shale. The rocks of Ordovician age are not used as a source of water supply in the county because they generally lie about 800 to 850 feet below the surface and contain water that generally has a dissolved-solids content of more than 5,000 ppm (parts per million).

The rocks of Ordovician age are overlain by dolomitic limestone, shale, and dolomite of Middle Silurian age. These rocks are not extensively utilized as a source of water. Although a few wells have penetrated the upper part of these rocks in the southern part of the county, the quality and quantity of water available from this source is uncertain.

The rocks of Silurian age are overlain by dolomite and dolomitic limestone of Middle Devonian age. These rocks underlie blue-black bituminous shale of Devonian age (Logan, 1932) or Devonian and Mississippian age (Patton, 1956). The dolomite and dolomitic limestone of Middle Devonian age are the chief bedrock source of water and are used locally in the southwestern part of the county for domestic, stock, and public supplies. Wells that tap this aquifer are generally less than 280 feet deep and yield as much as 850 gpm (gallons per minute). The shale of Devonian and Mississippian(?) age is not extensively used as a source of water in Starke County and the quantity and quality of water available from this rock is uncertain.

The bedrock is overlain by unconsolidated glacial drift of Pleistocene age. The drift forms several topographic features in the county (Leverett and Taylor, 1915, pl. 6; Wayne, 1958) such as the glaciofluvial plains in the north and western parts; the sand-covered glaciofluvial plains and ridges in the south central and north central part; and the ground moraine in the southeastern and northwestern part.

The unconsolidated rocks of Pleistocene age range in thickness from about 45 to more than 200 feet. The rocks consist chiefly of glaciofluvial sand and gravel, clayey till, some glaciolacustrine clay and silt, and wind-blown sand. The glaciofluvial sand and gravel is locally more than 140 feet thick and is the chief source of ground water for domestic, stock, industrial, and public supplies. Wells that tap this aquifer are generally less than 140 feet deep and yield from 5 to 1,600 gpm.

The unconsolidated rocks of Pleistocene age are overlain locally by thin alluvium, wind-blown sand, and organically rich sand, silt, and clay of Recent age. The deposits of Recent age are generally too thin to be a source of ground water. However, a few of the wells that are less than 10 feet deep may possibly tap sand of Recent age.

Plate 2 shows the availability of ground water in the consolidated and unconsolidated rocks underlying the county. Plate 3 shows the areal distribution of hardness of water from the sand and gravel of Pleistocene age. The water is very soft to very hard. The hardness is generally greater than 60 and less than 400 ppm. In much of the county the iron content does not exceed maximum concentration recommended in the U. S. Public Health Service drinking-water standard for iron and manganese together. This standard is exceeded locally in several broad areas in the northwestern and extreme southern and southwestern parts of the county.

The range in concentration of selected constituents and properties is summarized in the table below. This table shows the minimum, mode, and maxium concentrations of various constituents and properties of water from sand and gravel of Pleistocene age. Table 1 indicates the significance of the various constituents and properties of the water that are listed in table 5.

Constituent or property	Minimum (ppm)	Mode (ppm)	Maximum (ppm)
Bicarbonate (HCO_3)	44	165	566
Sulfate (SO_4)	<5	44	265
Chloride (Cl)	<4	7	104
Hardness as $CaCO_3$	36	145	520

Table 1.--Significance of selected dissolved mineral constituents and properties of ground water [a/]

Constituent or property	Significance
Iron (Fe)	Oxidizes to reddish-brown sediment upon exposure to air. More than about 0.3 ppm stains laundry and utensils reddish-brown. More than 0.5 to 1.0 ppm imparts objectionable taste to water. Larger quantities favor growth of iron bacteria. Objectionable for food processing, textile processing, beverages, ice manufacturing, brewing and other purposes.
Bicarbonate (HCO_3)	Bicarbonate in conjunction with carbonate (CO_3) produces alkalinity. Bicarbonate of calcium and magnesium decomposes in steam boilers and hot water facilities to form scale and release corrosive carbon-dioxide gas.
Sulfate (SO_4)	Sulfate in water containing calcium forms hard scale in steam boilers. In large amounts sulfate in combination with other ions gives bitter taste to water. Some calcium sulfate is considered beneficial in the brewing process.
Chloride (Cl)	Gives salty taste to drinking water when present in large amounts in combination with sodium. Increases the corrosiveness of water when present in large amounts.
Hardness as $CaCO_3$ (Calcium and magnesium)	Hard water increases amount of soap needed to make lather. Forms scale in boilers, water heaters, and pipes. Leaves curdy film on bathtubs and other fixtures and on materials washed in the water.

a/ Adapted in part from Palmquist and Hall (1961), p. 34-36

CONFINED AND UNCONFINED CONDITIONS

Ground water occurs in the consolidated and unconsolidated rocks of Starke County under confined (artesian) conditions or under unconfined (water-table) conditions. Under confined conditions the aquifer (water-yielding material) is overlain directly by relatively impervious material, and the water will rise above the level at which it is encountered in the aquifer. Under unconfined conditions the aquifer is overlain directly by permeable unsaturated material, and the water will not rise above the level at which it is encountered.

TYPES OF WELLS

Drilled, driven, and jetted wells are the principal types of water wells used in Starke County. Most water wells 3-inches or more in diameter are constructed by the cable-tool, or percussion method, but a few wells have been drilled by the rotary and reverse-rotary methods. Where the water-bearing material is sand and gravel, the well is generally finished with a well screen set in the aquifer below the bottom of the well casing. (See Rosenshein and Cosner, 1956, p. 6, for a detailed description of a well screen.) A modification of this type of well, the gravel-packed well, has a gravel lining inserted between the well screen and the water-bearing material. Where the water-bearing material is consolidated rock, the well casing is generally driven a short distance into the rock, and the well is finished as an open hole.

Water wells less than 3-inches in diameter are constructed in unconsolidated material by driving or jetting. The driven well consists of a small-diameter pipe having a drive point attached to the end, which is driven into shallow water-bearing material. The jetted well is constructed by forcing water under pressure out of a hollow-rod or small-diameter drill pipe that is fitted with a jetting bit. As the material is washed out of the hole ahead of the casing, the casing is driven down into the hole. After the water-bearing material is penetrated the well is generally finished with a well-point screen set in the water-bearing material below the bottom of the casing. Table 2 relates the grain-size in inches and millimeters to the slot and the gauze size of screens commonly used in water wells.

Oil or gas test holes in Starke County generally were drilled by the cable-tool method. The flood-control test holes were bored by a rig-mounted power auger. Various methods were used in these types of test-hole drilling to recover samples of material penetrated, such as, driving a sampling tube into the material after specific intervals of boring or collecting samples from the bailer after specific intervals of cable-tool drilling.

Table 2.--Grain size and equivalent screen openings

Grain size: After Wentworth (1922). Slot size: In thousandths (0.001) of an inch.
Equivalent screen openings: From commercial catalogs for water-well supplies. Gauze size: Number of wire strands per lineal inch.

Material	Grain size		Equivalent screen opening	
	Inches	Millimeters	Slot size	Gauze size
Gravel----------	>0.08	>2	> 80	-------
Very coarse sand-	.04 - .08	1 -2	40 - 80	<20
Coarse sand------	.02 - .04	.50 -1	20 - 40	40 - 20
Medium sand------	.01 - .02	.25 - .50	10 - 20	60 - 40
Fine sand--------	.005 - .01	.125 - .25	6 - 10	90 - 60
Very fine sand---	.002 - .005	.062 - .125	-------	-------
Silt-------------	.00015 - .002	.004 - .062	-------	-------
Clay-------------	<.00015	<.004	-------	-------

SUMMARY

Preliminary evaluation of the basic data shows that adequate quantities of ground water are available for domestic, stock, public, and industrial supplies from sand and gravel of Pleistocene age. The underlying bedrock also is used as a source of water. The rocks of Middle Devonian age are the chief bedrock source and are used locally in the southwestern part of the county for domestic, stock, and public supplies.

The chemical quality of water from the rocks of Pleistocene age varies. The water is soft to very hard. The iron content does not exceed the U. S. Public Health Service drinking-water standards for iron and manganese together in much of the county. However, this standard is exceeded locally in several broad areas in the county.

RECORDS

The records of about 340 wells and test holes are given in table 3. The table contains information about well construction, water levels, yields and drawdowns, conditions of occurrence, thickness and characteristics of water-bearing materials, type of pump, and other data. The altitude of the land surface at wells and test holes was interpolated from topographic maps.

Table 4 contains the selected logs of about 100 wells and test holes. This table gives the driller's description of material encountered, pertinent remarks with regard to the material, and authors' interpretation of the geologic age of the material.

The results of 186 partial chemical analyses of water are given in table 5. The analyses were determined in the field office of the Geological Survey. This table gives information about geologic source, temperature, concentration in parts per million of iron, bicarbonate, sulfate, chloride, and hardness (calcium,

magnesium) of water. The U. S. Public Health Service standards for drinking water are given in the table headnotes for iron and manganese together; sulfate, and chloride. No official standards have been established for hardness of water. However, water with respect to hardness is generally classified (Lamar, 1942, p. 25-26) as follows: 0-60 ppm soft; 61-120 ppm moderately hard; 121-200 ppm hard; more than 200 ppm very hard.

Table 6 contains the records of ten observation wells which were established prior to the investigation. The water levels in the observation wells were measured by manual measurements made with an engineer's steel tape graduated to a hundredth of a foot. The water levels are in feet below land-surface datum. Periodic water levels are given for the observation wells. For additional water levels see water-supply papers listed under U. S. Geological Survey in selected bibliography. The location of the observation wells is shown on plate 1.

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Table 3.--Records of wells and test holes in Starke County, Indiana

Well: See text for description of well-numbering system.
Altitude: Altitude of land-surface datum from topographic map.
Type of well: B, bored; Dm, driven; Dr, drilled; J, jetted.
Finish: Gp, gravel pack; Ow, open end; Oh, open hole; S, screen; dia, diameter in inches, g, gauze size, sl, slot size.
Character: G, gravel; Ls, limestone; Sd, sand; Sh, shale.
Geologic age: D, Devonian; M, Mississippian; Pl, Pleistocene; S, Silurian.
Condition of occurrence: C, confined; U, unconfined; see text for definition.

Water level: In feet below land-surface datum on date of completion of well, except where otherwise noted.
Use: D, domestic; Do, destroyed; I, industrial; Ir, irrigation; N, not used; O, observation; P, public supply; R, railroad; S, stock; T, test.
Type of pump and horsepower: C, centrifugal; J, jet; L, lift; P, pitcher; S, submersible; T, turbine; numeral indicates rated horsepower of electric motor.
Remarks: Ca, field chemical analysis in table 5; dd, drawdown; gpm, gallons per minute; L, log of well in table 4.

Well	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land-surface (feet)	Diameter of well (inches)	Finish	Water-bearing zone					Water level (feet)	Use	Type of pump and horsepower	Remarks
									Depth to top (feet)	Thickness (feet)	Character	Geologic age	Conditions of occurrence				
32/1W- 1P1	E. C. Overmyer	J. Payne	2-58	---	J	45	2	S; 3ft, 60g	----	------	Sd	Pl	----	---	D	J1/3	Ca.
1R1	A. Overmyer	Mr. Wolverton	About 1958	---	J	80	2	S; 3ft	----	------	Sd,G	Pl	----	---	D	J	Ca.
2A1	L. C. Hurt	J. Payne	About 1958	742	J	65	2	S; 3ft, 60g	----	------	Sd	Pl	----	20	D	-------	Had well 28 ft deep; was unreliable in extremely dry periods.
3A1	H. Eskridge, Sr.	----------	--------	737	Dm	50	1¼	S	----	------	Sd	Pl	----	---	D	-------	Ca.
3D1	V. Garland	----------	Summer 1958	727	Dm	42	1¼	S; 3ft	----	------	G	Pl	----	4	D	J	Well originally driven to 104 ft; pulled back to 42 ft because of "quicksand"; Ca.
6P1	A. Glueckert	R. Price	10- 6-60	---	J	72	2	S; 3ft, 60g, dia 1¼	----	------	Sd,G	Pl	C	10	D	P	Yield 20 gpm; L.
7G1	A. Piper	E. Brooker	10-27-55	---	J	120	2	S; 3½ft, 60g, dia 1½	60	60	Sd,G	Pl	C	10	D	P	Ca, L.
7H1	J. Tomassi	----------	1929	---	Dr	180	6	----------	----	------	G	Pl	C	---	---	-------	Formerly observation well Starke 1; water level measured 15.79 ft below lsd, 10-3-35; bedrock at 210 ft; L.
7H2	State of Indiana	----------	--------	---	Dm	-----	1¼	----------	----	------	Sd	Pl	----	---	P	-------	Flows; discharge measured 7 gpm, 11-8-57; water level measured 3.3 ft above lsd, 11-8-57; Ca.
7H3	----do----------	D. Denton	11- 5-60	---	Dr	82	4	S; 6ft, 40sl	----	------	Sd,G	Pl	C	15	D	-------	Dd 1 ft after 1 hr pumping 20 gpm; Ca, L.
7Q1	D. Hunt	E. Brooker	11- 4-55	---	J	99	2	S; 3½ft, 60g, dia 1½	61	38	Sd,G	Pl	C	3	D	-------	Yield 15 gpm; fine to medium sand and fine gravel overlain by about 31 ft blue clay and about 30 ft sand.
8A1	J. Krack	----------	About 1920	---	J	50	2	S; 3ft	----	------	Sd,G	Pl	----	---	D	C	Well at milk house 80 ft deep; Ca.
11K1	E. Hawkins	R. Price	8-30-60	---	J	50	2	S; 3ft, 60g, dia 1½	44	6	G	Pl	C	12	D	-------	Yield 20 gpm; Ca, L.
12B1	D. Overmyer	Mr. Davis	1952	---	J	85	2	S	----	------	G	Pl	----	18	D	J1/3	
13B1	C. Peters	----------	Before 1900	---	--	50	2	S; 3ft	----	------	G,Sd	Pl	C	22	D	L	Ca.
13B2	----do----------	Mr. Wolverton	1956	---	J	50	2	----do----------	----	------	G,Sd	Pl	C	22	D	L1/4	Gravel and sand overlain by clay.
13C1	----do----------	----------	--------	---	Dm	39	1¼	S	----	------	Sd	Pl	----	---	S	-------	
14C1	D. Osborn	----------	About 1949	---	Do	48	1¼	S; 3ft, 90g	----	------	G,Sd	Pl	----	7	D	J1/2	Ca.
17B1	F. W. Palmer	----------	--------	---	Dm	60	1¼	S	----	------	Sd	Pl	----	---	S	L	
17C1	----do----------	----------	1932	---	Dm	40	1¼	S; 3ft	----	------	Sd,G	Pl	----	7	D	J1/2	Has 2-inch well 90 ft deep, not in use; Ca.
18A1	C. White	----------	1960	---	Do	45	1¼	----do----------	----	------	Sd	Pl	C	---	D	J1/4	Has three other wells 45 ft deep; Ca.
18C1	Bass Lake Property Owners Assoc.	Layne-Northern Co., Inc.	7- 1-47	---	Dr	102	8-6	----------	----	------	Sd,G	Pl	C	2	T	-------	L.
18M1	State of Indiana	C. Miller	5-29-53	---	Dr	136	4	S; 14ft	106	30	Sd	Pl	C	4	P	-------	Ca, L.
20E1	P. Ramaz	----------	1959	---	Dm	34	2	S; 4ft	----	------	Sd,G	Pl	----	18	D	J1/2	Has two other wells, 34 and 28 ft deep; Ca.

32/1W-21C1	E. Torok	R. Price	--------	---	J	80	2	S; 3ft, 60g	50	10	Sd	Pl	C	15	S	J1/2	Medium to coarse sand overlain by 50 ft clay; clay at 80 ft; Ca.
21E1	C. Malott	----do----------	Fall 1954	---	J	140	2	----do----------	130	10	G,Sd	Pl	C	34	D	-------	L.
24B1	G. Osborn	----------	--------	---	Dn	26	2	S; 60g	----	------	Sd	Pl	----	16	D	J	Has to replace screen several times each year; Ca.
25F1	N. Wallskog	----------	1959	---	Dn	41	1¼	S; 3ft	----	------	Sd	Pl	----	21	D	L1/4	Well at barn 42 ft deep; Ca.
28M1	S. Jaslowski	G. Crist	Fall 1957	---	J	41	2	S; 3ft, 60g	----	------	G	Pl	----	---	S	J1/2	Ca.
28M2	----do----------	----do----------	5-60	---	J	31	2	----do----------	----	------	G	Pl	----	---	D	J1/2	Ca.
29N1	A. Scott	----------	Spring 1959	---	Dn	22	1¼	S; 3ft	----	------	Sd	Pl	----	---	D	L	Ca.
30E1	W. Thompson	----------	About 1949	---	Dn	21	1¼	----do----------	----	------	Sd	Pl	----	---	D	J	Ca.
31C1	P. T. Tanner	Fisher Bros. Well Drilling Co.	12-23-59	---	J	63	2½	S; 3ft, 60g, dia 1¼	54	9	Sd,G	Pl	C	12	S	-------	Yield 18 gpm; Ca, L.
32H1	R. Bennett	----------	Before 1900	---	Dn	30	1¼	S	----	------	Sd	Pl	----	---	D	L	Ca.
32N1	H. Myers	----------	1951	737	Dn	34	1¼	S; 3ft, 60g	----	------	Sd,G	Pl	----	---	D	J1/4	Ca.
33C1	P. Buchanan	----------	Spring 1954	---	Dn	20	1¼	S	----	------	Sd	Pl	----	---	D	J1/3	Ca.
33H1	G. H. Kalausing	----------	7-60	---	Dn	22	1¼	S	----	------	Sd	Pl	----	---	D	J	
35E1	E. Hampton	Fisher Bros. Well Drilling Co.	8-22-59	---	J	55	2½	S; 3ft, 60g, dia 1¼	47	8	G,Sd	Pl	C	28	D	-------	Yield 12 gpm; L.
32/2W-1B1	T. Milner	R. Price	Summer 1954	740	J	110	2	S; 3ft, 60g	104	6	Sd,G	Pl	C	18	D	J1/2	Ca, L.
2A1	J. S. Peterson	----------	1930	713	Dn	18	1¼	S	----	------	Sd	Pl	U	---	D	L	Ca.
2D1	J. Poort	----------	7-58	714	Dn	30	1¼	S; 5ft	----	------	Sd	Pl	----	7	D,P	L1/3	Ca.
2N1	J. Watson	Gold Hardware	Spring 1959	---	Dn	45	1¼	S	----	------	Sd	Pl	----	---	D	L	Ca.
3A1	S. Danko	----do----------	1959	712	Dn	15	1½	S; 3ft, 60g	----	------	Sd	Pl	U	4	D	T1/4	Ca.
5L1	P. L. Francois	Tamblyn Development Co.	3-28-41	718	Dr	1,171	---	----------	----	------	Sd,G	Pl	----	---	---	-------	Oil test; bedrock at 174 ft; L.
8D1	E. Bradley	----------	1949	---	Dn	27	1¼	S; 3ft	----	------	G	Pl	----	---	D	J1/3	Ca.
9R1	J. Stranos	----------	--------	---	J	80	2	S	----	------	Sd,G	Pl	----	---	D	L1/2	Ca.
10D1	M. Novak	----------	7-58	---	Dn	35	1½	S; 4ft	----	------	Sd	Pl	----	---	D	L	Ca.
10L1	W. B. Lowis	Java Oil Co.	1929	---	Dr	1,510	---	----------	----	------	Sd,G	Pl	----	---	---	-------	Oil test; bedrock at 170 ft; L.
11N1	S. A. Craigmile	----------	1942	---	Dn	15	1¼	----------	----	------	Sd	Pl	U	---	N	-------	Formerly observation well Starke 9; water level measured 2.89 ft below lsd, 8-1-42.
11R1	F. White	----------	--------	---	Dn	25	1¼	----------	----	------	Sd	Pl	U	---	N	-------	Formerly observation well Starke 10; water level measured 3.94 ft below lsd, 6-23-45.
12J1	S. Kartman	E. Brooker, Jr.	2-16-56	---	J	25	2	S; 3ft	5	20	Sd,G	Pl	U	5	D	-------	Yield about 15 gpm; pea-sized gravel overlain by 21 ft sand.
13E1	H. R. Smith	----------	1959	---	Dn	21	1½	S; 3ft, 60g	----	------	Sd	Pl	----	---	---	J1/4	For sprinkling.
13N1	J. Honan	Kolleman Hardware	--------	---	Dn	35	1½	----do----------	----	------	Sd	Pl	U	23	D	J1/3	
13R2	----do----------	Fisher Bros. Well Drilling Co.	7-19-60	---	J	113	2	S; 3ft, 60g, dia 1¼	----	------	Sd,G	Pl	C	2	D	-------	Yield 17 gpm; L.
14C1	S. A. Craigmile	----------	1935	714	Dr	82	6	S; 8ft	----	------	G	Pl	C	---	O	-------	Observation well Starke 2; water level measured 4.98 ft below lsd, 10-17-35.
14C2	----do----------	----------	--------	713	Dn	40	2	----------	----	------	Sd	Pl	U?	---	N	-------	Formerly observation well Starke 3; water level measured 4.33 ft below lsd, 10-17-35.
14C3	----do----------	----------	1942	712	Dn	18	1¼	Oo	----	------	Sd	Pl	U	---	N	-------	Formerly observation well Starke 8; water level measured 2.60 ft below lsd, 8-1-42.
14F1	----do----------	----------	1942	714	Dn	10	1¼	Oo	----	------	Sd	Pl	U	---	N	-------	Formerly observation well Starke 7; water level measured 2.18 ft below lsd, 8-1-42.
14K1	----do----------	----------	1942	713	Dn	13	1¼	Oo	----	------	Sd	Pl	U	---	N	-------	Formerly observation well Starke 6; water level measured 4.46 ft below lsd, 8-1-42.
17D1	Mr. Gumz	Arco Oil and Gas Co.	--------	---	Dr	1,125	---	----------	----	------	------	---	----	---	---	-------	Oil test; bedrock at 159 ft; water-bearing limestone from 159-180 ft.
17M1	R. Gumz	W. B. Johnson	3-24-53	---	Dr	255	6	Oo	146	109	Ls?	D	C	16	D	-------	Bedrock at 146 ft; Ca.
19B1	D. Dagnar	----------	1955	---	Dn	25	1½	S	----	------	Sd	Pl	----	---	D	J1/4	Ca.
19N1	O. Fedtke	Mr. Myers	Fall 1951	---	J	118	2	S	----	------	Sd,G	Pl	C	4	D	J1/2	Well across road 122 ft deep; most wells in area shallow; Ca.
20A1	G. Mazzio	Kennedy's Well Service	7- 3-57	---	J	54	2	S; 3½ft, 10sl, dia 1½	40	14	Sd,G	Pl	C	10	D	-------	Yield 15 gpm; sand and gravel overlain by 40 ft blue clay; Ca.

Table 3.--Records of wells and test holes in Starke County, Indiana--Continued

Well	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land-surface (feet)	Diameter of well (inches)	Finish	Water-bearing zone					Water level (feet)	Use	Type of pump and horsepower	Remarks
									Depth to top (feet)	Thickness (feet)	Character	Geologic age	Conditions of occurrence				
32/2W-20C1	Konrand Cabinet Shop	Kennedy's Well Service	6-18-60	---	J	80	2	S; 3ft, 60g, dia 1¼	75	6	G,Sd	Pl	C	7	I	--------	Yield 20 gpm; Ca, L.
21A1	H. Gerstandt	Westville Well Co.	11-30-60	---	J	78	2	S; 3ft, 60g, dia 1	65	13	Sd,G	Pl	C	8	D	--------	Ca, L.
21D1	W. Stanford	R. Price	1953	---	J	80	2	S; 3ft, 60g	65	15	Sd,G	Pl	C	12	D	J1/2	Has another well 80 ft deep at rug cleaning plant; sand and gravel overlain by 40 ft blue clay and 25 ft fine sand; Ca.
22P1	A. R. Martin	----do----------	6-55	---	J	80	2	----do----------	50	30	Sd,G	Pl	C	9	D	L	Yield 20 gpm; Ca, L.
23D1	J. Zingarelli	----------	Spring 1951	---	Dn	81	1½	S; 5ft	----	------	Sd	Pl	----	10	D	J	Has another well 26 ft deep; Ca.
23J1	C. Lucas	Westville Well Co.	7-14-59	---	J	148	3	S; 5ft, 10sl, dia 2	----	------	Sd	Pl	C	15	D	--------	Ca, L.
24B1	N. Rubbi	Fisher Bros. Well Drilling Co.	6-28-60	---	J	73	2½	S; 3ft, 60g, dia 1½	68	5	Sd,G	Pl	C	12	D	--------	L.
25D1	M. Lee	----------	About 1946	---	Dn	56	1½	S; 3ft	----	------	Sd,G	Pl	----	---	D	L	Well at barn 13 ft deep; Ca.
27R1	W. A. Bortell	----------	Spring 1942	---	Dn	71	1½	----do----------	----	------	Sd,G	Pl	C	---	D	J	Drove through several layers of hardpan; well at barn 30 ft deep; Ca.
28M1	P. Konrad	Kennedy's Well Service	7-20-57	---	J	120	2	S; 3½ft, 60g, dia 1½	115	5	G	Pl	C	16	D	--------	Yield 13 gpm; Ca, L.
29D1	L. Marks	----------	Spring 1958	---	Dn	41	1½	S; 4ft	----	------	Sd	Pl	----	8	D	J1/3	Drove through 2 ft hardpan at about 23 ft; Ca.
30B1	A. Eberhardt	----------	--------	---	Dr	140	----	----------	120	20	Sh	D,M	C	---	Do	--------	Bedrock at 120 ft; water from shale contained oil; had shallow well but water from well contaminated.
32R1	L. Posthume	----------	Spring 1952	---	Dn	20	1½	S	----	------	Sd	Pl	----	---	D	L1/4	Ca.
36D1	Seventh Day Adventist	R. Price	11- 9-60	---	J	67	2	S; 3ft, 12sl, dia 1½	----	------	Sd,G	Pl	----	7	P	--------	Yield 20 gpm; Ca, L.
36M1	J. Winter	----------	1939	---	Dn	24	1½	S; 3ft	----	------	Sd	Pl	----	---	D	L1/3	Ca.
36N1	D. Miller	----------	About 1856	---	Dn	13	1½	----do----------	----	------	Sd	Pl	----	---	D	L	
32/3W- 7R1	C. Babcock, Sr	----------	1959	692	Dn	36	1½	S; 3ft, 90g	----	------	Sd	Pl	C	---	D	C1/4	Had four test wells drilled in 1959; one test well 40 ft deep, two test wells 50 ft deep, one test well 94 ft deep; hit shale at 94 ft; test wells encountered three clay layers and much very fine sand or coarse silt; Ca.
8P1	E. Slansky	----------	About 1935	707	Dn	26	1½	S	----	------	Sd	Pl	----	---	D	J	Ca.
9B1	J. Fugate	----------	1851	687	Dn	23	1½	S; 3ft	----	------	Sd	Pl	----	---	D	J1/3	Ca.
10P1	L. Major	----------	1939	---	Dn	25	1½	S	----	------	Sd	Pl	----	---	D	P	Has two other wells, 30 ft deep and 50 ft deep; Ca.
10R1	W. Born	----------	--------	---	Dn	22	1½	S; 3ft, 60g	----	------	G	Pl	U	---	D,S	J1/4	Well at barn 14 ft deep; sand and gravel from 0-22 ft.
11D1	O. Edelsberger	----------	About 1948	---	Dn	30	1½	S	----	------	Sd	Pl	----	---	D	L1/4	Well at chicken house 30 ft deep; Ca.
13A1	H. Childers	----------	1951	---	Dn	30	1½	S	----	------	Sd	Pl	U	---	D	L	Ca.
13N1	O. Sakaguchi	Kelloman Hardware	--------	---	Dn	24	1½	S; 3ft, 60g	----	------	Sd	Pl	----	---	D	J1/3	Ca.
14D1	A. Bortucci	----do----------	--------	---	Dn	30	1½	----do----------	----	------	Sd	Pl	----	---	D	J1/2	Ca.
15R1	J. Cosari	----do----------	1954	---	Dn	22	1½	----do----------	----	------	Sd	Pl	----	---	D	J1/3	Ca.
16M1	Erie Railroad Co.	Layne-Northern Co., Inc.	5- 3-34	698	Dr	160	6-4	Oh	160	20	Ls	D	C	14	Do	--------	Bedrock at 133 ft; L.
16N1	Town of North Judson	----------	--------	708	Dr	220	8	Oh	120	100	Ls	D	C	---	Do	--------	Bedrock at 120 ft; see log well 16N3.
16N2	----do----------	----------	--------	708	Dr	210	8	Oh	120	80	Ls	D	C	---	P	T10	Do.

32/3W-16N3	Town of North Judson	----------	--------	708	Dr	220	8	Oh	120	100	Ls	D	C	---	P	T10	Bedrock at 120 ft; L.
17K1	Flintkote Corp.	Layne-Northern Co., Inc.	9- 4-57	697	Dr	93	8	----------	60	28	Sd	Pl	C	---	I,P	T10	Bedrock at 88 ft; Ca, L.
17K2	----do----------	----do----------	9-10-57	695	Dr	90	8	----------	48	36	Sd	Pl	C	---	T	--------	Bedrock at 80 ft; L.
17R1	Town of North Judson	----do----------	10- 1-53	710	Dr	225	6-4	----------	----	------	------	---	----	28	T	--------	Bedrock at 104 ft; L.
17R2	----do----------	----do----------	11-20-53	710	Dr	198	12	Oh	138	60	Ls	D	C	28	P	T40	Dd 21 ft pumping 500 gpm; bedrock at 100 ft; L.
18H1	New York Central System	----do----------	5-23	703	Dr	247	10-8	Oh	----	------	Ls	D	C	15	Do	--------	Dd 24 ft after 7 hr pumping 150 gpm.
18H2	----do----------	----------	--------	703	Dr	40	30-26	Gp; S; 30ft, dia 26	4	36	Sd	Pl	U	4	Do	--------	Dd 30 ft pumping 120 gpm.
18B1	Thermo-Products, Inc.	----------	--------	703	Dn	30	2	S	----	------	Sd	Pl	----	3	P	J1/4	
20A1	O. Sparks	Kolleman Hardware	--------	712	Dn	24	1¼	S; 3ft, 60g	18	6	Sd	Pl	U	18	D	J1/3	Ca.
20B1	J. E. Ness and Son	Indiana-Michigan Water Development Co.	8- 8-52	708	Dr	99	6	S; 10ft, 8sl, dia 4½	83	16	Sd	Pl	C	20	I	J	Dd 40 ft pumping 35 gpm; see log well 20B2; Ca.
20B2	----do----------	----do----------	4- 2-47	708	Dr	89	6	S; 8ft, 8sl, dia 3	82	18	Sd	Pl	C	19	I	J	Ca, L.
22Q1	Vanek Bros.	----------	Summer 1960	---	J	58	2	S	----	------	Sd,G	Pl	----	---	D	C1/2	Ca.
23A1	D. Fields	----------	--------	---	Dn	18	1¼	S; 3ft, 60g	9	18	Sd	Pl	U	9	D	J1/3	
24E1	Harshaw Pipe Line Constr. Co.	Rochester Well and Pump Co.	8-19-57	---	Dn	24	1¼	S; 10sl	12	12	Sd	Pl	U	12	Do	J	
26A1	E. Miller	----------	Summer 1958	---	Dn	16	1¼	S; 3ft	6	10	Sd	Pl	U	6	D	J1/4	Ca.
26H1	J. Kajor	----------	Summer 1958	---	Dn	30	1¼	S; 4ft	----	------	Sd,G	Pl	----	15	D	J1/3	Ca.
27M1	F. Majak	Paul Cox and Son	1950	670	Dr	198	6	Oh	----	------	Ls	D	----	8	Ir	T	Water from lower part of limestone; limestone overlain by 90 ft sand and gravel.
29A1	E. Gutscit	Kolleman Hardware	Spring 1954	704	Dn	19	1¼	S	----	------	Sd	Pl	U	---	D	J1/3	Ca.
29N1	L. Kotok	----------	1960	703	Dn	17	1¼	S	----	------	Sd	Pl	U	---	D	--------	Ca.
32A1	R. Gumz	J. P. Miller Artesian Well Co.	3-20-48	703	Dr	272	16	Oh	120	152	Ls	D	C	7	N	--------	Dd 138 ft after 2.5 hr pumping 300 gpm; bedrock at 85 ft; L.
32M1	----do----------	----do----------	10-10-47	702	Dr	100	---	----------	----	------	Sd	Pl	U	---	T	--------	See log well 32M2.
32M2	----do----------	----do----------	10-31-47	702	Dr	280	16	Oh	110	170	Ls	D	C	13	Ir	T45	Dd 117 ft after 5.5 hr pumping about 850 gpm; bedrock at 100 ft; L.
32P1	----do----------	W. B. Johnson	3-25-52	702	Dr	145	4	Oh	----	------	Ls	D	C	6	D,P	--------	Yield 60 gpm.
32P2	----do----------	----do----------	4- 8-55	702	Dr	283	8	Oh	----	------	Ls	D	C	12	---	S15	Dd 87 ft after 12 hr pumping 145 gpm; for fire protection, mint still, and potato washing; bedrock at 119 ft; Ca.
33C1	W. Lasky	----------	--------	706	Dn	30	2	S	24	8	Sd	Pl	U	24	---	L	For mint still; two other 2-inch wells at still, 30 ft deep.
33N1	J. Bochnicka	Rochester Well and Pump Co.	--------	704	J	80	2	S	----	------	Sd	Pl	----	---	D	--------	Water from shallow well contaminated; Ca.
33R1	W. Zimmerman	----------	Summer 1950	702	Dn	28	1¼	S; 3ft	20	6	Sd	Pl	U	20	D	J1/4	Drove through two layers of hardpan; Ca.
35P1	S. Wantola	----------	5-50	---	Dn	23	1¼	----do----------	16	7	Sd	Pl	U	16	D	L1/4	Ca.
36L1	H. Lippelt	----------	About 1949	---	Dn	22	2	S	----	------	Sd	Pl	U	---	D	J	Ca.
32/4W-1B1	R. Christenson	----------	About 1947	677	Dn	14	1¼	S; 3ft	6	8	G	Pl	U	6	D	J1/3	Ca.
1N1	C. Chosak	Kolleman Hardware	--------	678	Dn	----	1¼	S	----	------	Sd	Pl	----	---	D	--------	Ca.
2D1	J. Rajczyk	----------	1950	668	Dn	11	1¼	S	3	8	Sd	Pl	U	3	D	L1/4	Ca.
2L1	J. E. Adams	Westville Well Co.	9-15-58	678	J	81	3	S; 7ft, dia 2	52	9	Sd	Pl	C	9	D	--------	Ca; L.
8H1	R. Zacek	A. Potts	1955	667	Dr	37	4	----------	----	------	Sd,G	Pl	----	---	P		For watering lawn and garden; Ca.
8H2	----do----------	----------	--------	667	Dn	20	1½	S	----	------	Sd	Pl	----	---	D	J1/3	
9J1	M. Jacobson	Kolleman Hardware	--------	673	Dn	18	1½	S; 3ft, 60g	----	------	G	Pl	----	---	D	--------	
9K1	F. Hoppe	Westville Well Co.	--------	677	Dr	122	4	Oh	110	12	Ls	D	C	---	D	S1/2	Bedrock at 48 ft; limestone overlain by 62 ft shale; Ca.
11D1	F. Asselborn	----------	About 1946	687	Dn	10	1¼	S; 3ft	6	4	Sd	Pl	U	6	D	L1/3	Ca.
12D1	G. Sobock	Kolleman Hardware	--------	678	Dn	24	1½	S; 3ft, 60g	----	------	Sd	Pl	----	11	D	L1/4	Yield 4 gpm.
14A1	C. Kacafirek	Fitzgerald Well and Pump Co.	5-58	682	J	62	2	S	----	------	Sd,G	Pl	C	---	D	J1/2	Had drilled well 22 ft deep; was unreliable in extremely dry periods; Ca.
17E1	H. Kalinko	----------	1959	677	Dn	18	1½	S; 3ft	----	------	G	Pl	----	4	D	C1/2	Well at barn shallower; Ca.
19M1	L. J. Hartle	----------	About 1957	682	Dn	18	1¼	----do----------	----	------	Sd	Pl	U	---	D	L1/4	Ca.
20E1	E. M. Mueller	Kolleman Hardware	1958	678	Dn	22	1½	S; 4ft, 60g	----	------	Sd	Pl	U	---	D	L1/4	Has four other wells on farm; Ca.
20E2	----do----------	A. Stankoy	About 1940	678	Dr	187	4	----------	----	------	--------	---	----	---	Do	--------	Bedrock at about 45 ft.

Table 3.--Records of wells and test holes in Starke County, Indiana--Continued

Well	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land-surface (feet)	Diameter of well (inches)	Finish	Water-bearing zone					Water level (feet)	Use	Type of pump and horsepower	Remarks
									Depth to top (feet)	Thickness (feet)	Character	Geologic age	Conditions of occurrence				
32/4W-24B1	L. Foust	----------	Spring 1956	702	Dn	15	1¼	S; 3ft	9	6	Sd	Pl	U	9	---	P	For watering garden; Ca.
24B2	----do----------	----------	Fall 1959	702	Dn	21	1¼	----do----------	12	9	Sd,G	Pl	U	12	D	Cl/4	Sand and gravel from 0-21 ft.
24R1	O. Uhlir	Westville Well Co.	10-30-59	732	J	39	2	S; 3ft, 60g, dia 1	18	11	Sd	Pl	U	18	D	-------	Brown medium sand from 0-39 ft.
25H1	R. Gumz	J. P. Miller Artesian Well Co.	9-24-47	703	Dr	270	12	Oh	130	140	Ls	D	C	10	Ir	T40	Dd 135 ft after 4.5 hr pumping 420 gpm; bedrock at 118 ft; L.
27A1	J. Pechous	----------	About 1951	707	Dn	12	1¼	S	----	------	Sd	Pl	U	---	D	P	Ca.
28H1	A. Maleckl	----------	About 1955	702	Dn	15	1¼	S	----	------	Sd	Pl	U	---	D	J	Ca.
28M1	Little Company of Mary	Mr. Van Kopple	--------	710	J	28	---	S; 3ft	----	------	Sd	Pl	U	---	P	T10	Water supply from 24 wells 28 ft deep, pumped from header; sand from 0-27 ft underlain by 12 ft hardpan; silty fine sand at 39 ft; Ca.
29A1	Trustees, Railroad Township	C. W. Miller	2- 1-49	707	Dr	157	4	Oh	155	2	Ls	D	C	15	P	L1 1/2	Bedrock at 72 ft; broken limestone overlain by 83 ft shale; Ca.
30N1	E. K. Schwant	----------	1957	693	Dn	22	1¼	S; 3½ft	----	------	Sd	Pl	----	---	D	J1/4	Ca.
31A1	P. Badenhoop	----------	1948	707	Dn	38	1¼	S; 4ft, 80g	----	------	Sd	Pl	----	---	D	C1/4	Ca.
31N1	M. Lukon	----------	About 1920	712	Dn	16	1¼	S; 2ft, 80g	----	------	Sd	Pl	U	---	D	J1/2	Ca.
32R1	N. Safar	----------	About 1946	707	Dn	32	1¼	S; 3ft, 80g	----	------	Sd,G	Pl	----	5	D	J3/4	Drove through 3 ft layer of hardpan at about 28 ft; Ca.
34M1	J. Kochler	----------	About 1949	707	Dn	18	1¼	S; 8ft	----	------	Sd	Pl	U	---	D	-------	Ca.
36J1	J. and R. Gumz	W. B. Johnson	8-31-55	699	Dr	403	16	Oh	----	------	Ls?	S?,D	C	8	Do	-------	Dd 144 ft after 12 hr pumping 135 gpm; bedrock at 130 ft.
36N1	G. Zakotelsky	----------	Fall 1960	712	Dn	19	1¼	S; 3ft	7	12	Sd	Pl	U	7	D	L1/3	Ca.
33/1W- 2A1	H. Carmean	----------	1958	743	Dn	22	1¼	S	----	------	Sd	Pl	----	---	D	J1/4	Drove through 3 ft layer of hardpan; Ca.
2M1	J. Brower	S. J. Garl Well Drilling co.	2-22-61	733	Dn	23	1¼	S; 2½ft, 60g, dia 1¼	6	17	Sd	Pl	U	6	D	-------	Yield 5 gpm; Ca.
4R1	P. Holm	----------	1961	721	Dn	18	1¼	S; 4ft	8	10	Sd	Pl	U	8	D	C1/3	Ca.
5R1	J. Prchlik	----------	--------	717	Dr	75	2	S	----	------	Sd	Pl	----	---	D	L	Well in house 25 ft deep; Ca.
5R2	----do----------	----------	About 1931	718	Dr	175?	---	Oh	----	------	Ls?	D?	----	---	N	L	Ca.
7D1	J. Potocki	----------	About 1950	710	Dn	20	1¼	S	----	------	Sd	Pl	U	---	D	L1/4	Ca.
11H1	L. Maahs	----------	--------	742	Dn	20	1¼	S	----	------	Sd	Pl	U	---	D	L1/4	Ca.
12H1	G. Mlnarik	----------	--------	736	Dn	17	1¼	S; 3½ft	----	------	Sd	Pl	U	---	D	C1/3	Ca.
16J1	F. Ritchie	----------	--------	718	Dn	28	1¼	S; 3ft	----	------	Sd	Pl	---	---	D	L1/3	Ca.
19J1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-20-56	700	B	25	4½	----------	16	9	Sd	Pl	U	16	T	-------	See log well 19L1.
19L1	----do----------	----do----------	4-20-56	700	B	25	4½	----------	13	12	Sd	Pl	U	13	T	-------	L.
19M1	----do----------	----do----------	4-19-56	700	B	25	4½	----------	10	15	Sd	Pl	U	10	T	-------	See log well 19L1.
20N1	----do----------	----do----------	4-20-56	705	B	25	4½	----------	16	7	Sd	Pl	U	18	T	-------	L.
20P1	----do----------	----do----------	4-20-56	703	B	25	4½	----------	19	6	Sd,G	Pl	U	18	T	-------	L.
22D1	Trustees, Washington Township	C. Rouch	Summer 1959	721	Dr	65	4	S; 4ft	----	------	Sd	Pl	----	12	P	J2	Ca.
23R1	C and L Food Center	----------	About 1950	739	Dn	28	1¼	S	----	------	Sd	Pl	----	---	D,P	C	Ca.
25J1	G. Donley	----------	--------	742	Dn	22	1¼	S	----	------	Sd	Pl	----	---	D	L1/4	Ca.

33/1W-25N1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-21-56	720	B	25	4½		22	3	Sd	Pl	----	21	T	-------	L.
25P1	----do----------	----do----------	8-21-56	726	B	25	4½		8	10	Sd	Pl	U	8	T	-------	L.
25R1	R. Smith	----------	About 1945	728	Dr	38	2	S; 3ft, 60g	----	------	Sd	Pl	----	3	D	L1/4	Ca.
26M1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-21-56	720	B	25	4½		21	4	Sd,G	Pl	U	21	T	-------	L.
26P1	----do----------	----do----------	4-21-56	720	B	25	4½		----	------	------	---	----	---	T	-------	L
27D1	A. Yuriglas	----------	1957	717	Dn	25	1½	S; 3ft	----	------	Sd	Pl	----	---	D	L1/4	Ca.
27E1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-21-56	710	B	25	4½		22	3	Sd,G	Pl	C	20	T	-------	See log well 27P1.
27F1	----do----------	----do----------	4-21-56	716	B	25	4½		17	8	Sd,G	Pl	C	16	T	-------	L.
27G1	----do----------	----do----------	4-21-56	715	B	25	4½		16	9	Sd,G	Pl	U	16	T	-------	L.
28C1	----do----------	----do----------	4-20-56	710	B	25	4½		10	15	Sd,G	Pl	U	10	T	-------	L
28E1	----do----------	----do----------	4-20-56	705	B	25	4½		12	13	Sd,G	Pl	U	12	T	-------	L.
28H1	----do----------	----do----------	4-20-56	722	B	25	4½		----	------	Sd,G	Pl	U	---	T	-------	L
29A1	----do----------	----do----------	4-20-56	711	B	25	4½		11	14	Sd	Pl	U	11	T	-------	L.
29R1	J. E. Bolen	----------	--------	728	Dn	24	1½	S	----	------	Sd	Pl	----	---	D	J1/3	Ca.
29R2	A. C. Bolen	Arco Oil and Gas Co.	7-28	718	Dr	1,228	---	----------	----	------	------	---	----	---	---	-------	Oil test; bedrock at 212 ft.
30Q1	W. Rauhut	----------	Fall 1960	717	Dn	21	1½	S	18	3	Sd	Pl	U	18	D,S	J	Ca.
34D1	H. Voolkel	----------	About 1947	736	Dn	17	1½	S; 2½ft	13	4	S	Pl	U	13	D	L1/4	Ca.
34D2	J. D. McGovern	----------	--------	732	Dn	20	2	S	----	------	Sd	Pl	U	---	D	C1/4	Has also 1½-inch well at house; pumps both wells off header; supply unreliable in dry weather; difficult to obtain water on this side of Ober; Ca.
34D3	----do----------	C. Rouch	--------	732	J	200	2	----------	----	------	------	---	----	---	T	-------	No water reported; sand from 0-18 ft underlain by 182 ft of hardpan, clay with thin streaks of sand.
35B1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-21-56	720	B	25	4½	----------	----	------	------	---	----	---	T	-------	L.
35H1	D. Scutchfield, Jr.	----------	--------	737	Dn	25	1½	S	----	------	Sd	Pl	----	---	D	J1/2	C.
35R1	J. Katchmar	J. Payne	About 1958	747	J	80	2	S; 3ft, 60g	77	6	Sd	Pl	C	30	D	L	Coarse sand overlain by 77 ft clay; Ca.
36A1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	6-21-56	730	B	26	4½	----------	20	6	Sd	Pl	U	20	T	-------	L.
33/2W- 2D1	N. Taylor	Gold Hardware	--------	691	Dn	20	1½	S	----	------	Sd	Pl	U	---	D	J1/3	Ca.
3P1	G. Swartz	----------	1952	692	Dn	22	1½	S	----	------	Sd	Pl	U	---	D	J1/3	Ca.
3R1	W. Stuteville	Gold Hardware	--------	683	Dn	20	1½	S; 3ft, 60g	5	15	Sd	Pl	U	5	D	J1/4	Ca.
5L1	T. Hardel	----------	1956	679	Dn	20	1½	S	----	------	Sd	Pl	----	---	D	J	
6M1	Brems Farm Bureau Co-op	Gold Hardware	--------	679	Dn	20	2	S; 4ft, 60g	7	13	Sd,G	Pl	U	7	P	J1/3	Ca.
7P1	F. Wilson	----------	1956	678	Dn	20	1½	S; 3ft	11	9	Sd	Pl	U	11	D	L1/3	
8Q1	C. O. Coffin	----------	1959	683	Dn	15	1½	S; 3½ft	8	7	Sd	Pl	U	8	D	J1/3	Ca.
11J1	R. Postma	Gold Hardware	1949	715	Dn	40	1½	S; 3ft, 60g	----	------	Sd	Pl	----	23	D	L1/3	Ca.
13H1	State of Indiana	----------	1922	705	D	8	4	----------	3	3	Sd	Pl	U	---	T	-------	Water level measured 3.3 ft below lsd, 6-23-45; used as observation on Line 3 of the Kankakee drainage project by the Indiana Department of Conservation.
13N1	Dr. Henry	Gold Hardware	4-59	697	Dn	30	1½	S; 3ft, 60g	----	------	Sd	Pl	----	---	D	J1/3	Ca.
13N2	M. Marsh	D. Henderson and Son	2-28-61	699	Dr	107	4	Oh	90	17	Sh	D,M	C	3	D,S	-------	Dd 18 ft after 2 hr pumping 20 gpm; Ca, L.
14N1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-18-56	692	B	25	4½	----------	13	5	Sd	Pl	U	13	T	-------	L.
14Q1	----do----------	----do----------	4-18-56	695	B	25	4½	----------	10	15	Sd	Pl	U	10	T	-------	L
15N1	----do----------	----do----------	4-18-56	692	B	25	4½	----------	18	7	Sd	Pl	U	18	T	-------	See log well 15Q1.
15Q1	----do----------	----do----------	4-18-56	691	B	25	4½	----------	12	13	Sd	Pl	U	12	T	-------	L.
16J1	----do----------	----do----------	4-18-56	688	B	25	4½	----------	----	------	Sd	Pl	U	8	T	-------	L.

Table 3.--Records of wells and test holes in Starke County, Indiana--Continued

Well	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land-surface (feet)	Diameter of well (inches)	Finish	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character	Water-bearing zone: Geologic age	Water-bearing zone: Conditions of occurrence	Water level (feet)	Use	Type of pump and horsepower	Remarks
33/2W-16L1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-18-56	683	B	25	4½	----------	16	9	Sd	Pl	U	16	T	-------	L.
17J1	----do----------	----do----------	4-18-56	684	B	25	4½	----------	----	------	Sd	Pl	----	5	T	-------	L.
17P1	----do----------	----do----------	4-17-56	683	B	25	4½	----------	4	21	Sd	Pl	----	4	T	-------	L.
18P1	----do----------	----do----------	4-17-56	678	B	25	4½	----------	8	19	Sd	Pl	C	5	T	-------	See log well 18R1.
18R1	----do----------	----do----------	4-17-56	682	B	25	4½	----------	8	19	Sd	Pl	U	6	T	-------	L.
22D1	Nickle Plate Road	Layne-Northern Co., Inc.	5-21-47	700	Dr	103	12	Gp; S; 20ft, dia 8	8	95	Sd,G	Pl	U	8	R	-------	Dd 58.5 ft pumping 200 gpm; L.
22H1	Town of Knox	Indiana-Michigan Water Development Co.	8-28-34	710	Dr	144	12	S; 18ft, dia 11	----	------	Sd,G	Pl	----	18	N	-------	Dd 18 ft pumping 200 gpm; screen, upper 7ft 20sl, lower 12 ft 40sl; L.
22H2	Nickle Plate Road	Layne-Northern Co., Inc.	4-18-42	710	Dr	128	12	S; 10ft, 105sl, dia 10	----	------	Sd,G	Pl	----	11	N	T10	Dd 21 ft pumping 250 gpm; L.
22H3	----do----------	----do----------	11-12-41	710	Dr	125	---	----------	----	------	Sd,G	Pl	----	12	T	-------	See log well 22H2.
23D1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-19-56	695	B	25	4½	----------	12	13	Sd	Pl	U	12	T	-------	L.
23N1	Town of Knox	Layne-Northern Co.,	5-23-42	712	Dr	124	30	Gp; S; 20ft, 130sl, dia 12	94	30	Sd,G	Pl	C	13	P	T30	Dd 13 ft pumping 500 gpm; see log well 23N4.
23N2	----do----------	----do----------	5-18-52	710	Dr	122	---	S	98	24	Sd,G	Pl	C	12	P	T30	See log well 23N4.
23N3	----do----------	----do----------	2-17-52	710	Dr	125	6	----------	98	27	Sd,G	Pl	C	12	T	-------	Do.
23N4	----do----------	----do----------	4- 6-42	712	Dr	128	6	----------	94	30	Sd,G	Pl	C	12	T	-------	L.
24B1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-19-56	695	B	25	4½	----------	10	15	Sd	Pl	U	10	T	-------	L.
24C1	----do----------	----do----------	4-19-56	695	B	25	4½	----------	18	6	Sd	Pl	U	18	T	-------	L.
24H1	----do----------	----do----------	4-19-56	700	B	25	4½	----------	14	11	Sd	Pl	U	14	T	-------	See log well 24B1.
25B1	P. Malicki	----------	1955	713	Dn	20	1½	S; 3ft	----	------	Sd	Pl	----	7	D	J1/2	Ca.
25N1	P. Corey	----------	Spring 1954	718	Dn	26	1½	S; 3ft, 90g	----	------	Sd	Pl	----	6	D	J1/3	Ca.
26D1	Gold Hardware	Gold Hardware	--------	712	Dn	18	1½	S; 3ft, 60g	5	13	Sd	Pl	U	5	P	J1/3	Ca.
26G1	C. Kennedy	J. L. Black and A. L. Fautz	7-16-41	712	Dr	1,160	---	----------	----	------	Sd,G	Pl	----	---	---	-------	Oil test; bedrock at 130 ft; L.
27A1	Starke Memorial Hospital	Gold Hardware	1958	717	Dn	22	2	S; 4ft, 60g	5	17	Sd	Pl	U	5	---	J1	Yield 25 gpm; for boiler; Ca.
28E1	E. Faulhammer	----do----------	--------	702	Dn	28	1½	----------	----	------	Sd	Pl	----	7	D	J1/3	Ca.
28R1	A. Ostrander	----------	About 1890	711	Dn	40	1½	S	----	------	Sd	Pl	----	---	D	P	Have another well at house 20 ft deep; Ca.
30L1	R. E. Pitts	----------	1941	687	J	90	2	S; 4ft, 80g	----	------	Sd	Pl	C	---	D	L1/3	Sand overlain by 85 ft blue and yellow clay and sandy loam; Ca.
30L2	----do----------	E. Brooker	6-21-59	687	J	96	2	S; 4ft, 60 sl, dia 1½	85	11	Sd	Pl	C	15	D	-------	
31Q1	A. Chidalek	----------	1948	707	Dn	18	1½	S	----	------	Sd	Pl	U	---	D,S	L1/3	Ca.
33Q1	A Mann	----------	1-55	727	Dn	13	1½	S; 3ft	----	------	Sd	Pl	U	---	D	J	Ca.
34B1	Dr. H. Maury	D. Henderson and Son	2-27-81	720	Dr	203	4	Ok	184	19	Ls	D	C	18	D	-------	Dd 20 ft after 2 hr bailing 15 gpm; bedrock at 142 ft; Ca, L.
34F1	A. Odishoo	Westville Well Co.	7-15-58	718	J	50	2	S; 3ft, dia 1	9	41	Sd	Pl	U	9	D	-------	Brown and gray sand from 0-50 ft.
34H1	J. Dalano	Gold Hardware	--------	722	Dn	30	1½	S; 3ft, 60g	----	------	Sd	Pl	U	---	D	J1/4	Ca.
35D1	H. L. Henderson	C. Morosi	Fall 1960	718	Dn	18	1½	S	----	------	Sd	Pl	U	---	D	J	Ca.
33/3W-1L1	C. S. Swanson	----------	1933	682	Dn	25	1½	S	----	------	Sd	Pl	----	16	D	J	Ca.
10Q2	State of Indiana	----------	--------	670	Dn	18	1½	S	----	------	Sd	Pl	U	---	---	-------	Formerly observation well Starke 5; water level measured 7.8 ft below lsd, 9-30-41.

33/3W-10Q3	State of Indiana	----------	--------	670	Dn	30	1½	S	----	------	Sd	Pl	U	---	N	-------	Water level measured 2.5 ft below lsd, 11-15-35.
10Q4	----do----------	D. Denton	1960	678	Dr	107	4	S; 6ft, 25sl, dia 3½	----	------	Sd,G	Pl	----	---	---	-------	L.
13P1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-17-56	672	B	25	4½	----------	----	------	Sd	Pl	----	2	T	-------	L.
13R1	----do----------	----do----------	4-17-56	677	B	25	4½	----------	4	21	Sd	Pl	U	4	T	-------	L.
14N1	----do----------	----do----------	4-17-56	668	B	25	4½	----------	----	------	Sd	Pl	----	6	T	-------	L
14P1	----do----------	----do----------	4-17-56	672	B	25	4½	----------	5	20	Sd	Pl	U	5	T	-------	L
14R1	----do----------	----do----------	4-17-56	671	B	25	4½	----------	3	22	Sd	Pl	----	3	T	-------	See log well 13R1
15P1	----do----------	----do----------	4-14-56	670	B	25	4½	----------	12	13	Sd	Pl	C	6	T	-------	L.
15Q1	----do----------	----do----------	4-14-56	680	B	25	4½	----------	----	------	Sd	Pl	----	7	T	-------	L.
21G1	----do----------	----do----------	4-14-56	675	B	30	4½	----------	9	21	Sd,G	Pl	U	9	T	-------	See log well 21L1.
21M1	----do----------	----do----------	4-14-56	671	B	30	4½	----------	12	18	Sd,G	Pl	C	8	T	-------	L.
21L1	----do----------	----do----------	4-16-56	675	B	35	4½	----------	----	------	Sd	Pl	----	---	T	-------	L
21N1	----do----------	----do----------	4-16-56	675	B	30	4½	----------	17	13	Sd	Pl	C	11	T	-------	L
22D1	----do----------	----do----------	4-14-56	671	B	25	4½	----------	12	13	Sd	Pl	C	8	T	-------	L.
22G1	Marsh and Shaw	Westville Well Co.	9-18-50	672	J	72	2	S; 4½ft	----	------	Sd,G	Pl	----	---	D,S	-------	
24E1	C. Jornes	----do----------	--------	677	Dr	120	4	----------	----	------	Sd	Pl	----	---	N	-------	
33/3W-25P1	L. Banta	----------	1959	688	Dn	26	1½	S; 2ft, 60g	10	10	Sd	Pl	U	10	D	C1/3	Ca.
28R1	P. Harris	----------	--------	672	Dn	14	1½	S	9	5	Sd	Pl	U	9	D	L1/3	Ca.
29A1	Indiana Flood Control and Water Resources Commission	Corps of Engineers	4-16-56	675	B	30	4½	----------	----	------	Sd	Pl	U	---	T	-------	L.
29G1	----do----------	----do----------	4-16-56	675	B	35	4½	----------	13	19	Sd	Pl	U	13	T	-------	L.
29L1	----do----------	----do----------	4-16-56	675	B	30	4½	----------	----	------	Sd	Pl	---	11	T	-------	L.
29N1	----do----------	----do----------	4-16-56	675	B	30	4½	----------	12	18	Sd	Pl	C	11	T	-------	L.
30R1	----do----------	----do----------	4-16-56	675	B	30	4½	----------	14	16	Sd	Pl	C	12	T	-------	L.
33Q1	A. Eau	----------	1910	687	Dn	37	1½	----------	----	------	Sd,G	Pl	U	---	D	J1/2	Ca.
33Q2	----do----------	Westville Well Co.	1956	685	Dr	30	10	S; 10ft	10	20	Sd,G	Pl	U	10	D, Ir	C	
34F1	A. Johnson	----------	About 1941	602	Dn	20	1½	S; 3ft	----	------	Sd,G	Pl	U	---	D	L	Ca.
35N1	I. Almquist	----------	About 1958	702	Dn	35	1½	S	----	------	Sd	Pl	----	---	D,S	L	Well at barn 14 ft deep; Ca.
33/4W-33R1	Nazarene Church	Beach Plumbing and Well Co.	6-15-50	671	J	30	2	S; 4ft, 60g, dia 1	----	------	Sd,G	Pl	----	---	P	J1	Ca, L.
36C1	Chesapeake and Ohio Railway	Layne-Northern Co., Inc.	1-17-44	665	Dr	82	--	----------	37	29	Sd,G	Pl	C	7	T	-------	L.
36C2	----do----------	----do----------	8-25-45	665	Dr	85	--	Gp	58	7	Sd	Pl	C	4	Do	-------	Dd 22.5 ft after 5.5 hr pumping 125 gpm; see log well 36C1.
36C3	----do----------	----do----------	11- 5-40	665	Dr	250	--	----------	45	15	Sd,G	Pl	C	6	T	-------	Bedrock at 98 ft; L.
36C4	----do----------	----do----------	11-25-40	665	Dr	75	12	S; 18ft, dia 11¼	----	------	Sd,G	Pl	C	10	Do	-------	Dd 37 ft pumping 110 gpm; screen, upper 12 ft, 12 sl, 11 ft blank pipe, lower 6 ft, 20 sl; see log well 36C3.
36C5	----do----------	----do----------	3-22-45	663	Dr	87	--	----------	----	------	Sd,G	Pl	C	19	T	-------	See log well 36C3.
36F1	----do----------	----do----------	1-24-44	675	Dr	100	--	----------	82	13	Sd,G	Pl	C	13	T	-------	Bedrock at 95 ft; L.
36F2	----do----------	----do----------	4-30-48	675	Dr	95	30	Gp; S; 15ft, dia 12	82	13	G,Sd	Pl	C	7	N	-------	Dd 73 ft after 8 hr pumping 130 gpm; bedrock at 95 ft; L.
36F3	----do----------	----do----------	4- 3-45	675	Dr	96	----	----------	----	------	Sd,G	Pl	C	---	T	-------	Bedrock at 96 ft; L.
34/1W- 1A1	J. E. Short	P. W. Uncapher and G. N. Peterson	8-10-42	724	Dr	301	8½ 5½	----------	50	149	Sd,G	Pl	C	---	---	-------	Oil test; bedrock at 199ft; L.
1N1	P. Prentiss	P. Harness	1961	736	Dn	42	1½	S; 3ft, 10sl, dia 1½	----	------	Sd	Pl	C	---	D	J	
1Q1	F. Kramer	E. Brooker	12-23-55	727	J	42	2	S; 3½ft, 60g, dia 1½	35	7	G,Sd	Pl	C	8	P	L1/4	Sand and gravel overlain by 15 ft blue clay and about 20 ft sand.
2H1	W. Clark	----do----------	8-30-55	738	J	129	2	----do----------	----	------	Sd,G	Pl	C	27	D	T1/3	Ca, L.
2K1	W. Chadwick	Norris Well Drilling	8- 6-60	722	J	30	2	S; 3½ft, dia 1	12	18	G,Sd	Pl	U	12	D	-------	Yield 15 gpm; pea-sized gravel overlain by 18 ft yellow sand.
3M1	D. M. Burch	----------	About 1938	722	Dr	32	4	Co	----	------	Sd,G	Pl	---	---	D	J1/2	Ca.
6F1	R. Osborn	L. Stephani	--------	683	Dn	18	1½	S; 4ft, 60g	9	9	Sd	Pl	U	9	D	J1/3	Ca.
9D1	R. Pulliam	----------	1958	707	Dn	24	1½	S; 3ft	18	6	Sd	Pl	U	18	D	J1/2	Ca.
9J1	B. H. Thornburg	----------	--------	727	Dn	20	1½	S; 2½ft	12	8	Sd	Pl	U	12	S	L1/4	Ca.
9N1	H. Wisler	----------	--------	704	Dn	32	1½	S; 3ft	----	------	Sd	Pl	----	---	D	J	
9R1	C. M. Thornburg	----------	About 1947	718	Dn	16	1½	S	----	------	Sd	Pl	---	---	D	J	Ca.
12D1	L. Moclak	P. Harness	1958	717	Dn	32	1½	S; 3ft, 60g, dia 1½	----	------	Sd	Pl	---	---	D	-------	

Table 3.--Records of wells and test holes in Starke County, Indiana--Continued

Well	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land-surface (feet)	Diameter of well (inches)	Finish	Water-bearing zone: Depth to top (feet)	Water-bearing zone: Thickness (feet)	Water-bearing zone: Character	Water-bearing zone: Geologic age	Water-bearing zone: Conditions of occurrence	Water level (feet)	Use	Type of pump and horsepower	Remarks
34/1W-12B2	Mr. Raffin	E. Brooker	--------	717	J	104	2	S	----	------	Sd,G	Pl	----	---	D	-------	
12D1	Mr. Scott	----do----------	8-20-55	722	J	58	2	S; 3½ft, 60g,dia 1¼	44	14	Sd,G	Pl	C	8	D	L1/4	Fine sand and medium gravel overlain by 44 ft blue clay and sand.
12D2	E. E. Nelson	----do----------	1960	720	J	71	2	S; 4ft, 60g, dia 1¼	60	11	Sd,G	Pl	C	7	D	-------	See log well 12H1; Ca.
12D3	Mr. Atkinson	----do----------	10- 7-60	718	J	81	2	----do----------	70	11	Sd,G	Pl	C	10	D	-------	L.
12E1	Mr. Parr	----do----------	10- 3-55	715	J	78	2	S; 3½ft, 60g, dia 1¼	----	------	Sd,G	Pl	C	6	D	J3/4	Yield 15 gpm.
12E2	E. Devault	P. Harness	4-18-61	720	Dn	34	1¼	S; 3ft, 10sl	----	------	Sd	Pl	---	---	D	J	
12H1	Caprios Bros.	E. Brooker	5-17-60	728	J	72	2½	S; 4½ft, 60g, dia 1½	56	18	Sd,G	Pl	C	11	I	-------	Ca, L.
12M1	Mrs. Grassley	----do----------	7-13-59	723	J	86	2	S; 4ft, 60g, dia 1¼	60	26	Sd	Pl	C	12	D	-------	See log well 12H1; Ca.
13M1	D. Rice	R. Kirkley	--------	744	J	75	2	S; 3ft, 80g	----	------	G	Pl	C	28	D	L1/2	Ca.
15A1	Midwest Land Cleaners	J. Payne	12- 7-58	737	J	24	2	S; 3ft, 60g, dia 1¼	5	19	Sd	Pl	U	5	D	-------	Yield 19 gpm; medium sand overlain by 18 ft fine sand.
15Z1	E. Swanson	----------	Summer 1958	714	Dn	30	1¼	S; 3ft	----	------	Sd	Pl	----	7	S	P	Ca.
17N1	J. Taylor	----------	About 1950	707	Dn	23	1¼	S; 3ft, 90g	----	------	Sd	Pl	----	10	D	J1/2	Ca.
19K1	Brown Motel	L. Stephani	--------	702	Dn	32	1¼	S; 4ft, 60g	----	------	G	Pl	----	15	P	J1/3	Ca.
20A1	M. J. Harness	----------	1956	717	Dn	45	1¼	S	----	------	Sd	Pl	----	---	D	J	Ca.
20Q1	C. Coffin	----------	--------	706	Dn	30	1¼	S	----	------	Sd	Pl	----	---	D	L	Ca.
20Q2	----do----------	----------	About 1955	708	Dn	17	1¼	S; 2ft	11	6	Sd	Pl	U	11	S	P	Has gone dry in extremely dry periods.
21R1	E. Harness	P. Harness	Summer 1959	707	Dn	33	1¼	S; 3ft	----	------	Sd	Pl	----	10	D	J	Ca.
22J1	G. Trapp	E. Brooker	4-14-60	730	J	44	2	S; 4ft, 60g, dia 1¼	38	8	Sd,G	Pl	C	18	D	-------	Ca, L.
23J1	M. Chalman	----do----------	12- 6-55	737	J	87	2	S; 3½ft, 80g, dia 1½	83	4	G	Pl	C	20	D	J1/4	Well at chicken house 102 ft deep with 18 ft water level, 11-14-55; Ca, L.
23N1	Trustees, Oregon Township	----------	--------	723	Dr	------	3	S	----	------	Sd,G	Pl	----	---	P	JJ	
23N2	----do----------	Srivor Drilling Co.	--------	727	Dr	85	4	S; 8ft, 10sl	70	15	Sd,G	Pl	C	22	P	J5	Ca, L.
24E1	W. O. Sabel	----------	--------	738	Dn	20	1¼	S; 3ft	----	------	Sd	Pl	----	6	D,S	C1/2	Ca.
24H1	K. Holm	----------	--------	752	Dn	22	1¼	----------	----	------	Sd	Pl	----	---	D	L1/4	Ca.
24R1	C. Haug	E. Peterson	1946	744	Dn	23	1¼	S	----	------	Sd	Pl	----	---	D	P	Ca.
26B1	S. Hack	E. Brooker	10- 3-55	726	J	93	2	S; 3½ft, 60g, dia 1½	----	------	G	Pl	C	10	D	J1/3	Yield 10 gpm; Ca.
26C1	F. Koppenhoffer	----do----------	1-10-55	732	J	26	2	----do----------	----	------	Sd	Pl	----	9	D	-------	Ca.
27A1	D. Bergstrom	----------	--------	726	Dn	87	1¼	----------	----	------	G	Pl	C?	---	O	-------	Observation well Starke 11; water level measured 15.51 ft below lsd, 7-1-48.
27A2	F. Koppenhoffer	E. Brooker	11-12-60	724	J	71	2	S; 4ft, 60g, dia 1¼	60	11	Sd	Pl	C	17	D	-------	L.
28A1	Lonzo Oil Co.	----do----------	10-11-60	704	J	84	2	----do----------	----	------	Sd	Pl	----	15	P	-------	Ca.
28N1	P. A. Drake	----------	--------	704	Dn	15	1¼	S	----	------	Sd	Pl	----	---	D	J1/4	Ca.
29J1	G. Keller	E. Brooker	Spring 1958	707	J	102	2	S	----	------	Sd,G	Pl	C	---	D	J1/2	Ca.
30J1	F. Yates	P. Harness	1956	706	Dn	28	1¼	S; 3 ft, 60g, dia 1¼	----	------	Sd	Pl	----	---	D	L	
35D1	S. White	----------	1958	728	Dn	28	1¼	S	----	------	Sd	Pl	----	---	D	J1/2	
36H1	I. Koysan	E. W. Schroodor	3-22-57	752	J	80	2	S; 3ft, 60g, dia 1¼	75	5	G	Pl	C	12	D	L1/4	Yield 10 gpm; Ca, L.
34/2W-1R1	R. Osborn	Oldfield Irrigation Well Co.	--------	697	Dr	89	32-18	Gp; S	38	30	G,Sd	Pl	C	8	Ir	T240	Dd 37 ft pumping 1600 gpm; bedrock at 75 ft; L.
7P1	E. Norman	----------	8-60	676	Dn	45	1¼	S	----	------	Sd	Pl	----	---	D	J1/4	Ca.
8M1	C. Orr	----------	1959	682	Dn	15	1¼	S	----	------	Sd	Pl	U	---	D	J1/3	Ca.
10D1	A. Gimple	Gold Hardware	--------	682	Dn	30	1¼	S; 3ft, 80g	----	------	Sd	Pl	----	---	D	-------	
11B1	M. Kensinger	E. Brooker	8-30-60	682	J	145	2	S; 4ft, 60g, dia 1¼	121	24	Sd	Pl	C	16	D,S	-------	Ca, L.
11N1	L. Marsh	Westville Well Co.	Fall 1957	684	J	74	2	S; 3ft	----	------	Sd	Pl	----	4	D	J1/3	Shale at 79 ft; well at house across road 102 ft deep in sand and gravel; Ca.
		----------	About	692	Dn Dn	22	1¼	S; 3ft, 10sl	----	------	Sd	Pl	U	---	D	L1/2	Well at barn 22 ft deep; Ca.

34/2W-12R1	C. Bigler	----------	About 1954	692	Dn	22	1½	S; 3ft, 10sl	----	------	Sd	Pl	U	---	D	L1/2	Well at barn 22 ft deep; Ca.
12R2	W. Harbeknecht	P. Harness	--------	688	Dn	22	2	S; 4ft, 80g, dia 2	----	------	Sd	Pl	----	---	D	-------	Ca.
14H1	H. E. Hardesty	----------	About 1950	685	J	42	2	S	----	------	Sd	Pl	----	---	D,S	J1	Well at barn 20 ft; Ca.
16L1	W. Kraszyk	L. Stephani	--------	677	Dn	19	1½	S; 4ft, 80g	----	------	Sd	Pl	U	---	De	-------	
16M1	C. Kraszyk	----do----------	--------	682	Dn	25	1½	S; 4½ft, 80g	13	12	Sd	Pl	U	13	P	J1/3	Ca.
19A1	A. Mantz	----do----------	--------	677	Dn	18	1½	S; 3ft, 80g	7	11	Sd,G	Pl	U	7	D	L1/3	Ca.
21N1	O. Henricks	----------	--------	684	Dn	28	1½	S; 3ft	----	------	Sd	Pl	----	---	D	J1/4	Ca.
23A1	O. C. Pflugshaupt	----------	About 1941	683	Dn	40	1½	S	----	------	Sd	Pl	----	---	D,S	L1/2	Well at barn 12 ft deep; Ca.
24G1	L. Stephani	L. Stephani	--------	693	Dn	13	1½	S; 3ft, 80g	5	8	Sd	Pl	U	5	N	-------	
24J1	Town of Hamlet	Indiana-Michigan Water Development Co.	2-23-43	698	Dr	109	8	S; 30½ft, P	----	------	G,Sd	Pl	U	9	P	C25	Dd 11 ft pumping 100 gpm; gravel and coarse sand from 83-109 ft; blue clay at 109 ft; record missing from 0-83 ft.
24J2	----do----------	----do----------	12- 6-41	698	Dr	97	8	S; 15ft, dia 6	----	------	G,Sd	Pl	U	8	P	C25	Dd 15 ft pumping 200 gpm.
26D1	T. Nagai	----------	--------	678	Dn	35	1½	S	----	------	Sd	Pl	----	11	S	P	Ca.
26J1	W. Bopo	L. Stephani	--------	692	Dn	27	1½	S; 4ft, 80g	----	------	Sd	Pl	----	4	D	J1/4	Ca.
31A1	L. Gearhart	----------	1958	678	Dn	30	1½	S	----	------	Sd	Pl	U	4	D	J1/3	Ca.
33B1	A. Pflugshaupt	----------	Summer 1952	681	Dn	12	1½	S; 3ft	4	8	Sd	Pl	U	4	D		
35J1	Lincoln National Life Ins. Co.	H. A. Joern	10- 32	694	Dr	1,203	10-8	----------	----	------	------	---	----	---	---	-------	Oil test; bedrock at 127 ft; water-bearing limestone from 200-210 ft, 460-485 ft and 700-710 ft.
36C1	W. M. Joern	----do----------	1-33	699	Dr	205	10	----------	----	------	------	---	----	---	---	-------	Oil test; bedrock at 137 ft; water-bearing limestone from 200-205 ft; limestone overlain by 63 ft shale.
34/3W-13H2	Pennsylvania Railroad Co.	Layne-Northern Co., Inc.	2-23-38	680	Dr	115	---	----------	----	------	Sd	Pl	----	28	T	-------	Bedrock at 112 ft; L.
25A1	E. Kottka	----------	4-41	685	Dn	28	1½	S; 3ft	----	------	Sd	Pl	----	4	S	P	Ca.

Table 4.--Selected logs of wells and test holes in Starke County, Indiana

Well 32/1W-6P1

Type of record: Driller's log. Altitude: ---

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System			
Recent and Pleistocene Series:			
Sand, yellow	12	12	
Sand and gravel; muddy, with streak of blue clay	51	63	
Sand, coarse	12	75	
Clay, soft, blue	35	110	
Sand and clay; very hard, muddy	5	115	
Clay, gray, with sand	19	134	
Sand and gravel; very hard, muddy	4	138	
Clay, very tough, brown	4	142	

Well 32/1W-7G1

Type of record: Driller's log from memory. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Clay with streaks of sand	60	60	
Sand with streaks of clay	50	110	
Sand, fine	6	116	
Gravel, medium	4	120	

Well 32/1W-7H1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand	10	10	
Clay	5	15	
Gravel	5	20	
Record missing	190	210	Limestone at 210 feet.

Well 32/1W-7H3

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, yellow	20	20	
Clay, blue	15	35	
Sand and gravel	9	44	
Clay, yellow	6	50	
Hardpan	6	56	
Sand, fine	6	62	
Clay, blue	8	70	
Hardpan	3	73	
Sand	3	76	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/1W-7H3--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand and gravel	6	82	
Clay	13	95	
Quicksand and large gravel; dirty	20	115	

Well 32/1W-11K1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand and clay	8	8	
Clay, blue	36	44	
Gravel	6	50	

Well 32/1W-18C1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, red	2	2	
Sand, gray	4	6	
Clay, sandy	3	9	
Clay, gravelly, red	16	25	
Clay, sandy	4	29	
Sand, fine	9	38	
Sand and clay	14	52	
Sand	4	56	
Sand and gravel; with clay balls	5	61	
Clay	7	68	
Clay and gravel	3	71	
Gravel and sand	23	94	
Clay and gravel	8	102	

Well 32/1W-18M1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, gray	27	27	
Clay and gravel	3	30	
Sand, gray	24	54	
Clay	2	56	
Clay and gravel	12	68	
Clay and sand	27	95	
Clay, hard, and gravel	11	106	
Sand	30	136	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/1W-21E1

Type of record: Driller's log from memory. Altitude: ---

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand----------	30	30	
Clay, blue----------	100	130	
Gravel and sand----------	10	140	

Well 32/1W-31C1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, yellow----------	16	16	
Sand----------	12	28	
Clay, blue, and sand----------	17	45	
Clay, blue----------	9	54	
Sand----------	5	59.	
Gravel----------	4	63	

Well 32/1W-35E1

Type of record: Driller's log. Altitude: ---

Quaternary System			
Recent and Pleistocene Series:			
Sand----------	28	28	
Clay, blue, and gravel----------	19	47	
Sand----------	3	50	
Gravel----------	5	55	

Well 32/2W-1B1

Type of record: Driller's log from memory. Altitude: 740 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine----------	40	40	
Clay, blue, with streaks of muddy sand----------	64	104	
Gravel and sand----------	6	110	
Clay, blue----------	60	170	

Well 32/2W-5L1

Type of record: Sample study by C. K. Clark, Pure Oil Co. Altitude: 718 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Record missing----------	159	159	
Sand, pebbly, varicolored-------	5	164	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-5L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, pebbly, varicolored, with few pieces of gray shale and light-gray limestone----------	10	174	
Devonian and Silurian Systems: undifferentiated:			
Limestone, dense to crystalline, soft to medium, light-gray, with fairly abundant fossil fragments and some medium to coarse sand----------	8	182	Sand probably from above.
Record missing----------	2	184	
Limestone, shaly, gray to dark-gray, with few pieces of light-gray chert----------	10	194	Limestone has weathered appearance.
Limestone, shaly, gray to dark-gray, with few pieces of glauconitic material----------	10	204	
Dolomite, dense, hard, limy, gray, with abundant light-gray chert----------	15	219	
Dolomite, dense to very finely crystalline, medium to hard, slightly calcareous, buff to brown, with few pieces of chert and fossil fragments----	10	229	
Dolomite, medium to hard, shaly, light-gray, with few pieces of light-gray chert and some pyrite----------	10	239	
Limestone, dense, soft to medium, lithographic, light-gray, with few pieces of darker-gray hard cherty limestone----------	10	249	
Limestone, dense, soft to medium, lithographic, light-gray, with few pieces of green shale and fossil fragments----------	10	259	
Limestone, dense, hard, gray to dark-gray----------	10	269	
Limestone, dense, hard, gray to dark-gray, with few fossil fragments----------	10	279	
Limestone, medium to hard, quite shaly, light-gray, with few enclosed quartz grains and fossil fragments----------	10	289	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-5L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Devonian and Silurian Systems; undifferentiated:			
Limestone, dense, medium to hard, quite shaly, light-gray, with some enclosed quartz grains and few fossil fragments	11	300	
Limestone, crystalline, soft to medium, light-gray	10	310	
Limestone, crystalline, soft, light-gray, with light-gray hard dense to very finely crystalline dolomite and few pieces of light-gray to tan chert	10	320	
Limestone, crystalline, soft, light-gray, more dolomitic, with some coral reef material-	10	330	Some evidence of solution.
Dolomite, dense, hard, light-gray	30	360	
Dolomite, very finely crystalline, light-gray, with few pieces of light-gray to buff chert	20	380	Some evidence of solution.
Limestone, dense, hard, dolomitic, shaly, gray to dark-gray-	10	390	
Dolomite, dense to very finely crystalline, medium to hard, light-gray, with few pieces of weathered gray chert	10	400	
Dolomite, dense to very finely crystalline, medium to hard, light-gray, with little or no chert	30	430	
Dolomite, very finely crystalline, hard, light-gray to light-buff, with some coral reef material	10	440	
Dolomite, dense, hard, light-gray	10	450	
Dolomite, dense, hard, light-gray, very slightly crystalline	10	460	Some evidence of solution.
Dolomite, dense, hard, light-gray, more crystalline	10	470	Do.
Dolomite, dense, hard, buff	10	480	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-5L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Devonian and Silurian Systems; undifferentiated:			
Dolomite, dense to slightly crystalline, medium to hard, light-gray	10	490	
Dolomite, dense to crystalline, mostly crystalline, hard, light-gray	10	500	
Dolomite, dense, medium to hard, slightly calcareous, light-gray	10	510	
Dolomite, dense to crystalline, medium to hard, light-gray, with few pieces of chert	10	520	
Do	10	530	More chert than above.
Do	10	540	Chert 50 percent.
Do	10	550	No chert.
Dolomite, dense to crystalline, medium to hard, bluish-gray	20	570	Some evidence of solution.
Dolomite, dense, hard, light-gray, with light-gray chert	10	580	Chert 75 percent.
Do	10	590	Chert 60 percent.
Do	10	600	Chert 20 percent.
Do	10	610	Chert 10 percent.
Dolomite, dense, medium to hard, bluish-gray	10	620	
Dolomite, dense, hard, light-gray	40	660	
Dolomite, dense, medium to hard, gray, darker than above	10	670	
Dolomite, dense to crystalline, medium to hard, gray to light-brown	10	680	
Dolomite, dense to slightly crystalline, medium to hard, slightly calcareous, light-buff	5	685	
Dolomite, dense to slightly crystalline, medium to hard, slightly calcareous, light-buff, with light-gray chert	10	695	Chert 35 percent.
Do	10	705	Chert 30 percent.
Do	15	720	Chert 10 percent.
Dolomite, dense, light-gray to buff	10	730	
Dolomite, dense, light-gray to buff, and chert	10	740	Chert 50 percent.

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-5L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Devonian and Silurian Systems; undifferentiated:			
Dolomite, dense, hard, dark-gray to brown	10	750	
Dolomite, dense, medium to hard, dark-gray, with some pyrite and few pieces of chert	12	762	
Dolomite, dense, medium to hard, dark-gray, with more pyrite and few pieces of gray-green shale	3	765	
Dolomite, dense, medium to hard, dark-gray, with few pieces of chert	10	775	
Record missing	5	780	
Shale, soft, gray-green, with few pieces of dark-gray dense to crystalline dolomite	5	785	
Dolomite, dense to crystalline, shaly, dark-gray, with few fossil fragments	15	800	
Do	10	810	More shaly than above.
Ordovician System:			
Upper Ordovician? Series:			
Shale, soft to medium, dolomitic, gray to dark-gray	30	840	
Shale, soft, gray	50	890	
Record missing	180	1,070	
Ordovician System:			
Middle Ordovician Series:			
Dolomite, crystalline, medium to hard, light-brown	16	1,086	Some evidence of solution.
Do	10	1,096	Softer than above.
Dolomite, crystalline, light-brown	16	1,112	
Dolomite, crystalline, brown, with few pieces of green glauconitic material	13	1,125	
Dolomite, crystalline, brown	6	1,131	Some evidence of solution.
Do	11	1,142	Softer than above.
Dolomite, crystalline, buff	5	1,147	
Dolomite, crystalline, medium to hard, light-buff to brown, with few pieces of green shale-	11	1,158	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-5L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Ordovician System:			
Middle Ordovician Series:			
Dolomite, crystalline, hard, light-buff	7	1,165	
Dolomite, crystalline, soft to medium, light-buff to brown	6	1,171	

Well 32/2W-10L1

Type of record: Sample study by unknown person. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand and gravel	170	170	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale	40	210	
Devonian and Silurian Systems; undifferentiated:			
Limestone, coarsely crystalline, tan to white	10	220	
Limestone, coarsely crystalline, sandy, tan to white	25	245	
Dolomite, coarsely crystalline, white, with very rounded quartz grains	15	260	
Limestone, coarse, gray, with gray chert	25	285	Chert 5 percent.
Limestone, shaly dolomitic light-gray to white	35	320	
Dolomite, coarsely crystalline, white	90	410	
Shale, soft, blue-gray	25	435	
Dolomite, coarse, sandy, slightly shaly, brown	35	470	
Dolomite, shaly, gray, pyritic	30	500	
Dolomite, coarsely crystalline, white	30	530	
Shale, soft, gray, micaceous	30	560	
Dolomite, coarsely crystalline, white	25	585	
Dolomite, coarsely crystalline, brown	25	610	
Dolomite, coarsely crystalline, gray	65	675	
Dolomite, light-brown, slightly glauconitic and pyritic	35	710	
Dolomite, coarsely crystalline, white, slightly pyritic	30	740	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-10L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Devonian and Silurian Systems; undifferentiated:			
Dolomite, finely crystalline, brown, pyritic	25	765	
Dolomite, coarsely crystalline, gray	55	820	
Ordovician System:			
Upper Ordovician? Series:			
Shale, soft, calcareous, gray	40	860	
Shale, hard, gray-brown, micaceous	223	1,083	
Middle Ordovician Series:			
Dolomite, coarsely crystalline, tan, with rounded quartz grains	5	1,088	
Dolomite, tan	20	1,108	
Dolomite, finer and more calcitic, tan	5	1,113	
Limestone, very fine, tan	5	1,118	
Limestone, coarsely crystalline, hard, gray	5	1,123	
Limestone, coarsely crystalline, hard, buff	5	1,128	
Limestone, coarsely crystalline, hard, gray	35	1,163	
Dolomite, finely crystalline, tan, with small pieces of shale	5	1,168	
Dolomite, finely crystalline, hard, tan, with pieces of shale	30	1,198	
Limestone, finely crystalline, hard, tan, with white chert	10	1,208	
Limestone, coarsely crystalline, hard, gray	15	1,223	
Limestone, finely crystalline, hard, tan, with green shale	15	1,238	
Limestone, very finely crystalline, light-tan	15	1,253	
Limestone, finely crystalline, gray	10	1,263	
Limestone, finely crystalline, hard, light-tan	10	1,273	
Limestone, finely crystalline, hard, gray	75	1,348	
Limestone, finely crystalline, hard, dark-gray, with quartz	27	1,375	
Limestone, very finely crystalline, light-gray	5	1,380	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-10L1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Ordovician System:			
Middle Ordovician Series:			
Limestone, finely crystalline, tan, with rounded quartz grains	20	1,400	Quartz 25 percent.
Limestone, fine, tan	15	1,415	No quartz.
Lower Ordovician? Series:			
Sandstone; mostly well-rounded frosted white pure quartz grains	10	1,425	
Dolomite, finely crystalline, calcitic, gray	10	1,435	
Dolomite, finely crystalline, tan, with few quartz grains	5	1,440	
Sandstone; well-rounded frosted pure quartz grains, with little pyrite	45	1,485	
Limestone, finely crystalline, hard, dolomitic, gray, with quartz	5	1,490	Quartz 40 percent.
Dolomite, hard, tan; with rounded and angular sand grains, little pyrite, and chert	10	1,500	
Dolomite, very fine, hard, tan, slightly glauconitic, with chert	10	1,510	

Well 32/2W-13R2

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand	61	61	
Clay, blue, and gravel	14	75	
Clay, blue	12	87	
Clay, blue, and sand	5	92	
Gravel and blue clay	9	101	
Sand	9	110	
Gravel	3	113	

Well 32/2W-20C1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Dirt, sand, and blue clay	18	18	
Clay, blue	21	39	
Clay, soft, blue, with fine sand	36	75	
Gravel and sand; coarse	6	81	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-21A1

Type of record: Driller's log. Altitude: ---

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand----------	18	18	
Clay, blue----------	47	65	
Sand and gravel----------	13	78	

Well 32/2W-22P1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand----------	20	20	
Clay----------	30	50	
Sand, fine, muddy----------	10	60	
Sand, clean, becoming coarser---	12	72	
Gravel----------	8	80	

Well 32/2W-23J1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, brown----------	30	30	
Sand, gray----------	40	70	
Gravel, gray----------	5	75	
Sand, gray----------	15	90	
Gravel, gray----------	18	108	
Sand, hard, gray----------	9	117	
Silt, hard, gray----------	20	137	
Sand, coarse, hard, white-------	11	148	

Well 32/2W-24B1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand----------	40	40	
Clay, blue, and sand----------	28	68	
Sand and gravel----------	5	73	

Well 32/2W-28M1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, yellow----------	21	21	
Sand, gray----------	8	29	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/2W-28M1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Clay, blue, mixed with gravel---	41	70	
Clay, blue----------	45	115	
Gravel, coarse, gray----------	5	120	

Well 32/2W-36D1

Type of record: Driller's log. Altitude: ---

Quaternary System:			
Recent and Pleistocene Series:			
Sand----------	10	10	
Sand and gravel----------	10	20	
Sand and gravel; muddy, with streaks of clay----------	38	58	
Clay, hard, blue----------	4	62	
Sand and gravel----------	5	67	

Well 32/2W-16M1

Type of record: Driller's log. Altitude: 698 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Fill and sand----------	19	19	
Sand, coarse----------	18	37	
Sand, fine----------	8	45	
Sand and gravel----------	1	46	
Clay, soft----------	24	70	
Clay, gritty, hard----------	39	109	
Clay, gritty, very hard---------	21	130	
Gravel mixed with clay----------	3	133	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale, soft, with shells--------	12	145	
Shale, hard, brown----------	12	157	
Shale, broken----------	3	160	
Middle Devonian Series:			
Lime, yellow----------	16	176	
Lime, gray, broken----------	4	180	

Well 32/3W-16N3

Type of record: Driller's log. Altitude: 708 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand and clay----------	35	35	
Clay, blue----------	50	85	
Sand, fine----------	10	95	
Hardpan----------	25	120	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/3W-16N3--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Devonian System:			
Middle Devonian Series -			
Limestone----------	100	220	

Well 32/3W-17K1

Type of record: Driller's log. Altitude: 697 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Top soil----------	1	1	
Sand, fine----------	9	10	
Clay----------	2	12	
Sand----------	6	18	
Clay----------	3	21	
Sand----------	7	28	
Clay, sandy----------	4	32	
Clay, sandy----------	4	32	
Sand----------	3	35	
Clay, sandy----------	9	44	
Clay, hard----------	16	60	
Sand, fine, with traces of coal-	28	88	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale, dark-brown----------	5	93	

Well 32/3W-17K2

Type of record: Driller's log. Altitude: 695 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Top soil----------	2	2	
Clay, gravelly, with iron ore---	2	4	
Sand, fine----------	9	13	
Sand and gravel----------	6	19	
Clay, sandy, gray, with gravel and boulders----------	4	23	
Clay with strips of sand and gravel----------	10	33	
Sand and gravel----------	4	37	
Clay----------	11	48	
Sand, fine, dirty----------	15	63	
Sand, fine----------	21	84	
Clay----------	2	86	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale, brown----------	4	90	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/3W-17R1

Type of record: Driller's log. Altitude: 710 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand	32	32	
Clay	8	40	
Sand, fine, muddy	9	49	
Clay	19	68	
Sand, fine	7	75	
Sand, fine, muddy	20	95	
Clay, sandy	9	104	
Mississippian and Devonian System:			
Lower Mississippian and Upper Devonian Series:			
Shale	29	133	
Middle Devonian Series:			
Lime	35	168	
Shale	4	172	
Lime	53	225	

Well 32/3W-17R2

Type of record: Driller's log. Altitude: 710 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand	35	35	
Clay, sandy	5	40	
Sand, gravel, and clay	5	45	
Sand, muddy	8	53	
Clay	27	80	
Sand, muddy	16	96	
Shale, sandy	4	100	Gravel?
Mississippian and Devonian System:			
Lower Mississippian and Upper Devonian Series:			
Shale	38	138	
Middle Devonian Series:			
Limestone	60	198	

Well 32/3W-20B2

Type of record: Driller's log. Altitude: 708 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, yellow	28	28	
Sand, gray	6	34	
Clay and sand	31	65	
Sand, blue	5	70	
Clay and sand	12	82	
Sand	18	100	
Clay, blue	3	103	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/3W-32A1

Type of record: Driller's log. Altitude: 703 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Record missing	25	25	
Quicksand, blue	25	50	
Clay, blue	30	80	
Sand and gravel	5	85	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale and slate	25	110	
Shale, black and brown	10	120	
Middle Devonian Series:			
Lime, hard, gray	65	185	
Lime, blue	5	190	
Lime, gray	60	250	
Lime, brown	22	272	

Well 32/3W-32M2

Type of record: Driller's log. Altitude: 702 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand	45	45	
Clay, blue	50	95	
Sand and gravel	5	100	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Lime and shale	10	110	
Middle Devonian Series:			
Lime, hard, gray	35	145	
Lime, gray	5	150	
Lime, blue	15	165	
Lime, hard, gray	75	240	
Lime, brown	40	280	

Well 32/4W-2L1

Type of record: Driller's log. Altitude: 678 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, brown	15	15	
Clay, gray	30	45	
Silt, gray	7	52	
Sand, gray	9	61	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 32/4W-25H1

Type of record: Driller's log. Altitude: 703 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, yellow	15	15	
Sand, gray	35	50	
Clay, blue	35	85	
Shale and lime shale	15	100	Gravel.
Sand, clay, and gravel	8	108	
Shale and clay	10	118	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Shale	12	130	
Middle Devonian Series:			
Lime, gray	50	180	
Lime, blue	20	200	
Lime, brown	45	245	
Lime, gray	25	270	

Well 33/1W-19L1

Type of record: Driller's log. Altitude: 700 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, slightly organic, dark-brown	1	1	
Silt, sandy, clayey, dark-brown	1	2	Sand 25 percent.
Sand, fine, brown	1	3	
Sand, fine to medium, dark-brown	1	4	Sand mostly fine.
Sand, fine to medium, lighter-brown, with few very fine gravel	4	8	
Sand, fine to medium, gravelly	2	10	
Sand, with some fine gravel	3	13	
Sand, fine	12	25	

Well 33/1W-20N1

Type of record: Driller's log. Altitude: 705 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, clayey, dark-brown	1	1	Sand 25-30 percent.
Clay, sandy, dark-brown	2	3	Sand 35 percent.
Clay, sandy, brown	1	4	Sand 20 percent.
Clay, sandy, light-brown	1	5	Sand 25 percent.
Clay, sandy, yellowish-brown	1	6	Sand 35 percent.
Sand, fine, light-brown, with trace of clay	1	7	
Sand, fine to medium, light-brown	3	10	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/1W-20N1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine to medium, with bits of decayed wood	8	18	
Sand, fine to medium	5	23	
Silt, sandy	2	25	

Well 33/1W-20P1

Type of record: Driller's log. Altitude: 703 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, very sandy, slightly organic, dark-brown	1	1	
Silt, sandy, clayey, dark-brown	2	3	Sand 20-25 percent.
Sand, fine, light-brown, with trace of silt	1	4	
Sand, fine to coarse, with trace of medium and coarse sand, light-brown	4	8	Sand mostly fine.
Sand, fine, light-brown	2	10	
Sand, fine, with trace of clay	4	14	
Sand, fine to medium	4	18	
Sand, fine to medium, with few fine gravel	7	25	

Well 33/1W-25N1

Type of record: Driller's log. Altitude: 720 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, dark-brown, with trace of fine roots	1	1	Sand 40 percent.
Sand, brownish-yellow, with some silt	2	3	
Sand, fine	3	6	
Sand, fine to coarse, light-brown, with few very fine gravel	4	10	Sand mostly fine to medium.
Sand, very gravelly	4	14	
Silt, sandy	8	22	
Sand, silty	3	25	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/1W-25P1

Type of record: Driller's log. Altitude: 726 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, dark-brown	2	2	
Sand, yellowish-brown	5	7	
Sand, silty, brown	1	8	Silt 8 percent.
Sand, fine	3	11	
Sand, grayish-brown	2	13	
Sand, silty	3	16	Silt 10 percent.
Sand, fine to coarse, silty	2	18	Silt 14 percent; sand mostly fine to medium.
Clay, sandy, bluish-gray	3	21	
Clay, sandy, gravelly, bluish-gray	4	25	Gravel 5 percent.

Well 33/1W-26M1

Type of record: Driller's log. Altitude: 720 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, dark-brown	1	1	Fine sand 25 percent.
Sand, fine, silty, dark-brown	1	2	Silt 30 percent.
Sand, fine to coarse, brown	2	4	Sand mostly fine.
Sand, fine to coarse, rusty-brown, with few very fine gravel	1	5	Do.
Sand, fine to coarse, silty, gravelly, brown	2	7	Very fine gravel 15 percent; sand mostly fine.
Sand, fine to coarse, gravelly	3	10	Sand mostly fine to medium.
Gravel, sandy	1	11	
Sand, gravelly	3	14	
Silt, sandy	5	19	
Sand, silty, with few gravel	6	25	

Well 33/1W-26P1

Type of record: Driller's log. Altitude: 720 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine to coarse, slightly silty, brown, with few very fine gravel	1	1	Sand mostly fine.

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/1W-26P1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine to coarse, brown, with fine gravel	1	2	Sand mostly fine.
Sand, fine to coarse, brown, with some medium to coarse gravel	1	3	Gravel up to 1 inch; sand mostly fine.
Sand, fine to coarse, brown	1	4	Sand mostly fine.
Sand, fine to coarse, gravelly, brown	1	5	Gravel 45 percent, up to 3/4 inch; sand mostly fine.
Gravel, sandy, light-brown	11	16	Gravel up to 1 1/4 inch; sand 35 percent.
Sand, gravelly	8	24	
Silt, sandy	1	25	

Well 33/1W-27F1

Type of record: Driller's log. Altitude: 715 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, clayey, dark-gray	1	1	
Clay, sandy, dark-grayish-brown, with little silt	1	2	
Clay, sandy, dark-grayish-brown	1	3	Sand 25-30 percent.
Clay, sandy, brown	1	4	Sand 35-40 percent.
Sand, fine to coarse, silty, brown, with very fine gravel	2	6	Silt 20 percent.
Sand, fine to coarse, brown, with fine gravel	4	10	Sand mostly fine to medium
Sand, gravelly, with trace of clay	4	14	
Silt, sandy	3	17	
Sand, gravelly, clayey	8	25	

Well 33/1W-27G1

Type of record: Driller's log. Altitude: 715 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine to coarse, light- to dark-brown, with few fine gravel	5	5	Sand mostly fine.
Sand, brown, with fine gravel	11	16	

Well 33/1W-27G1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, clayey, with fine gravel--	2	18	
Sand, silty, fine to medium-----	7	25	

Well 33/1W-28C1

Type of record: Driller's log. Altitude: 710 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, slightly silty, light-brown----------	2	2	
Sand, fine, slightly clayey, brown----------	1	3	
Sand, fine, reddish-brown-------	1	4	
Sand, fine to coarse, light-brown	2	6	Sand mostly fine.
Sand, fine to coarse, with few fine gravel, brown----------	3	9	Do.
Sand, with fine gravel----------	1	10	
Sand, gravelly, clayey----------	3	13	
Sand, fine to medium----------	7	20	
Sand, fine to medium, silty-----	5	25	

Well 33/1W-28E1

Type of record: Driller's log. Altitude: 705 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, brown----------	1	1	Silt 15 percent.
Clay, sandy, silty, dark-brown--	1	2	Sand 20 percent.
Clay, sandy, dark-brown---------	1	3	Sand 35 percent.
Do----------	2	5	Sand 20 percent.
Do----------	1	6	Sand 15 percent
Do----------	1	7	Sand 35-40 percent.
Sand, fine, clayey, brown-------	2	9	Clay 20 percent.
Gravel, sandy, clayey----------	1	10	
Sand, gravelly, clayey----------	3	13	
Sand, fine, with some gravel----	3	16	
Sand, fine----------	6	22	
Sand, fine, with some gravel----	3	25	

Well 33/1W-28H1

Type of record: Driller's log. Altitude: 722 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, silty, brown--------	1	1	Silt 20 percent.
Sand, fine, brown, with little silt----------	1	2	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/1W-28H1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, light-reddish-brown-	1	3	
Sand, fine, tan----------	1	4	
Sand, fine, silty, light-yellowish-brown----------	1	5	Silt 30 percent
Sand, fine, silty, light-brown--	1	6	Silt 25 percent.
Sand, fine, yellowish-brown-----	5	11	
Sand, fine, silty----------	3	14	
Sand, fine, with trace of silt--	2	16	
Sand, fine----------	2	18	
Sand, fine gravelly----------	2	20	
Sand, fine, with few fine gravel	5	25	

Well 33/1W-29A1

Type of record: Driller's log. Altitude: 711 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, clayey, dark-brown-	1	1	Sand 40 percent.
Clay, silty, sandy, dark-brown--	1	2	Silt 35 percent.
Sand, fine, silty, light-brown--	2	4	Silt 20 percent.
Sand, fine to coarse, silty, brown, with trace of fine gravel----------	2	6	Silt 15 percent; sand mostly fine.
Sand, fine to coarse, slightly clayey, brown----------	1	7	Sand mostly fine.
Sand, fine to medium----------	15	22	
Sand, with few fine gravel------	3	25	

Well 33/1W-35B1

Type of record: Driller's log. Altitude: 720 feet

Quaternary System:			
Recent and Pleistocene Series:			
Silt, sandy, dark-brown--------	1	1	Fine sand 20 percent.
Silt, sandy, with little clay, dark-brown----------	2	3	Sand 15-20-percent.
Silt, very sandy, yellowish-brown----------	1	4	Sand 35 percent.
Sand, fine, silty, brownish-yellow----------	1	5	Silt 25 percent.
Sand, fine, yellowish-brown, with trace of silt----------	1	6	
Sand, fine, light-brown---------	5	11	
Sand, fine, gravelly----------	3	14	
Silt, sandy----------	11	25	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/1W-36A1

Type of record: Driller's log. Altitude: 730 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, silty, brown	1	1	Silt 3 percent.
Sand, brown, with fine to coarse gravel	2	3	Gravel 20 percent.
Sand, fine, gravelly, silty, brown	4	7	Gravel 15 percent; silt 10-15 percent.
Sand with fine gravel	3	10	Gravel 10 percent.
Sand, medium	4	14	
Sand, fine to coarse	7	21	
Sand, silty	5	26	Silt 10 percent.

Well 33/2W-13N2

Type of record: Driller's log. Altitude: 699 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, brown	6	6	
Sand, yellow	18	24	
Clay, gray	48	72	
Clay and sand	18	90	
Mississippian and Devonian Systems:			
Lower Mississippian and Upper Devonian Series:			
Slate, black	17	107	

Well 33/2W-14N1

Type of record: Driller's log. Altitude: 692 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, silty, clayey, dark-brown, with few small roots	1	1	Silt 25 percent.
Sand, fine, light-yellowish brown	7	8	
Clay, sandy	1	9	
Sand	9	18	
Silt, sandy	7	25	

Well 33/2W-14Q1

Type of record: Driller's log. Altitude: 695 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, silty, brown, with trace of clay	1	1	Silt 25 percent.

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/2W-14Q1--Continued

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Clay, sandy, silty, dark-brown--	1	2	Sand 35-40 percent.
Sand, fine, brown, with trace of silt----------	1	3	
Sand, very fine, light-brown---	2	5	
Sand, fine, brown----------	3	8	
Sand, fine, with gravel--------	1	9	
Sand, clayey----------	3	12	
Sand, fine to medium----------	2	14	
Sand with lignite----------	4	18	
Sand, fine----------	7	25	

Well 33/2W-15Q1

Type of record: Driller's log. Altitude: 691 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, silty, slightly organic, dark-brown, with few small roots----------	1	1	
Sand, fine, brown with little silt----------	1	2	
Sand, fine, light-brown, with trace of silt----------	2	4	
Sand, fine to coarse, brown-----	3	7	Sand mostly fine.
Sand, fine, brown----------	15	22	
Sand, fine, with trace of lignite----------	3	25	

Well 33/2W-16J1

Type of record: Driller's log. Altitude: 688 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Clay, sandy, dark-brown---------	2	2	Fine sand 40 percent.
Sand, fine, clayey, brown-------	1	3	Clay 25-30 percent.
Clay, sandy, brown----------	1	4	Sand 20 percent.
Sand, very fine, slightly clayey, light-brown----------	1	5	
Sand, fine, yellowish-tan, with trace of clay----------	2	7	
Sand, very fine, light-grayish-brown, with trace of clay-----	2	9	
Sand, with trace of lignite-----	5	14	
Sand, fine, silty, with trace of lignite----------	2	16	
Record missing----------	9	25	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/2W-16L1

Type of record: Driller's log. Altitude: 683 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, silty, dark-gray, with few small roots	1	1	
Sand, fine, light-brown	1	2	
Sand, fine, light-tan	12	14	
Sand with trace of lignite	11	25	

Well 33/2W-17J1

Type of record: Driller's log. Altitude: 684 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, very clayey, dark-brown, with trace of fine gravel	1	1	
Sand, fine, light-yellowish-brown, with trace of clay	1	2	
Sand, fine, light-brown	2	4	
Clay, sandy, brown	2	6	Sand 25 percent.
Sand, fine, slightly clayey, brown	2	8	
Sand, fine	3	11	
Sand with trace of lignite	11	22	
Record missing	3	25	

Well 33/2W-17P1

Type of record: Driller's log. Altitude: 683 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, very clayey, dark-brown	1	1	
Sand, fine, clayey, brown	1	2	Clay 25-30 percent.
Sand, fine, slightly clayey, brown	1	3	
Clay, sandy, dark-brown	1	4	Fine sand 40-45 percent.
Sand, fine, clayey, brown	2	6	Clay 35-40 percent.
Do	1	7	Clay 20 percent.
Sand, fine, with trace of clay	3	10	
Sand with lignite	4	14	
Sand, fine	6	20	
Sand with lignite	5	25	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/2W-18R1

Type of record: Driller's log. Altitude: 682 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, clayey, dark-brown	1	1	Clay 15-20 percent.
Sand, fine, light-brown, with trace of clay	1	2	
Sand, fine, clayey, brown	1	3	Clay 30-35 percent.
Clay, sandy, dark-grayish-brown	1	4	Sand 35 percent
Clay, sandy, dark-brown	1	5	Sand 30 percent.
Sand, very fine, clayey	3	8	Clay 15-20 percent.
Sand with small amount of clay	2	10	
Sand, fine, clayey	2	12	
Sand, fine	10	22	
Sand with trace of lignite	3	25	

Well 33/2W-22D1

Type of record: Driller's log. Altitude: 700 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, yellow	15	15	
Sand, coarse, clean, gray	15	30	
Sand, medium, muddy, gray	17	47	
Clay, gummy, gray	1	48	
Gravel; broken shale and slate	6	54	
Sand, very fine, muddy	25	79	
Sand, fine, clean, yellow	6	85	
Sand, coarse, and gravel	2	87	
Sand, coarse, yellow	2	89	
Sand, coarse, gray	14	103	Boulders and dirty sand at 103 feet.

Well 33/2W-22H1

Type of record: Driller's log. Altitude: 710 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Fill	4	4	
Sand, sugar-sized	22	26	
Sand, fine	30	56	
Sand, clayey, dirty	46	102	
Sand	10	112	
Hardpan and boulders	13	125	
Sand and gravel	19	144	

Table 4.--Selected logs of wells and test holes in Starke County--Continued

Well 33/2W-22H2

Type of record: Driller's log. Altitude: 710 feet.

Material	Thickness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Cinders	2	2	
Sand, red	9	10	
Sand, light-red	7	17	
Sand	21	38	
Clay	33	71	
Sand, silty	12	83	
Gravel and clay	20	103	
Clay	9	112	
Gravel and sand	14	126	

Well 33/2W-23D1

Type of record: Driller's log. Altitude: 692 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand, fine, slightly silty, dark-brown, with few small roots	1	1	
Sand, fine, brown, with trace of silt	2	3	
Sand, fine, brown	5	8	
Sand, fine to medium	8	16	
Sand, fine to coarse	6	22	Sand mostly fine
Sand, fine, silty	3	25	

Well 33/2W-23N4

Type of record: Driller's log. Altitude: 712 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Top soil	5	5	
Sand, medium, brown	15	20	
Sand, medium, brown, clean	23	43	
Clay, blue	2	45	
Clay, sandy	49	94	
Sand, coarse, clean	3	97	
Gravel, medium, clean	9	106	
Sand, coarse, clean	15	121	
Gravel, medium, clean	3	124	
Clay	2	126	