

**STATE OF INDIANA**  
**DEPARTMENT OF NATURAL RESOURCES**  
**DIVISION OF WATER**

BULLETIN NO. 29

**GROUND-WATER RESOURCES OF**  
**WEST-CENTRAL INDIANA**

**Preliminary Report: Vermillion County**



Prepared by the  
**GEOLOGICAL SURVEY**  
**UNITED STATES DEPARTMENT OF THE INTERIOR**  
In cooperation with the  
**DIVISION OF WATER**  
**DEPARTMENT OF NATURAL RESOURCES**

1965

INDIANA DEPARTMENT OF CONSERVATION

John E. Mitchell, Director

BULLETIN NO. 29

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Charles H. Bechert, Director

GROUND-WATER RESOURCES OF WEST-CENTRAL INDIANA

Preliminary Report: Vermillion County

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## GROUND-WATER RESOURCES OF WEST-CENTRAL INDIANA

Preliminary Report: Vermillion County

By F. A. Watkins, Jr., and D. G. Jordan

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### ABSTRACT

Vermillion County, in west-central Indiana, has an area of about 263 square miles. Consolidated rocks of Pennsylvanian age and unconsolidated rocks of Pleistocene age are the major sources of ground water for domestic, stock, industrial, and municipal supplies. Wells in Vermillion County vary greatly in depth and yield. Wells tapping Pennsylvanian rocks range in depth from about 50 to 550 feet and in yield from less than 1 to about 75 gpm (gallon per minute). Some wells tapping the rocks of Pennsylvanian age yield no water. Wells tapping Pleistocene sand and gravel range in depth from about 15 to 230 feet and in yield from about 1 to 1,200 gpm. Field chemical analyses of water from these sources show that the chemical quality differs greatly. A modal grouping was used to find the most frequent values for the sulfate and chloride contents and for the hardness of water in Vermillion County. This method yields the following results for water from aquifers of Pennsylvanian age: sulfate, 14 ppm (parts per million); chloride, 15 ppm; and hardness, 345 ppm; and for water from aquifers of Pleistocene age: sulfate, 14 ppm; chloride, 7 ppm; and hardness, 341 ppm. Locally water from these sources may exceed the U. S. Public Health Service (1962) drinking-water standards for either iron, sulfate, or chloride content.

This preliminary report contains tabulated records of about 245 wells and other drilled holes giving information about well construction, water levels, conditions of occurrence, and character of the water-bearing material; selected logs for about 121 wells and other drilled holes giving the drillers' description of the material encountered and a tentative interpretation by the authors of the geologic age; records of 5 springs giving information about geologic source, yield and temperature of the water; results for 72 field chemical analyses of water from wells, 5 from springs, and 10 from streams, giving iron, bicarbonate, sulfate, and chloride contents, and the hardness of water; and water levels in 1 observation well indicating the magnitude of short and long-term water-level fluctuations in the unconsolidated rock. 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 map of Vermillion County shows the location of all water wells, holes drilled for purposes other than water supply, springs, and stream sampling sites listed in this report. An additional map shows availability of ground water.

## INTRODUCTION

### Purpose and Scope

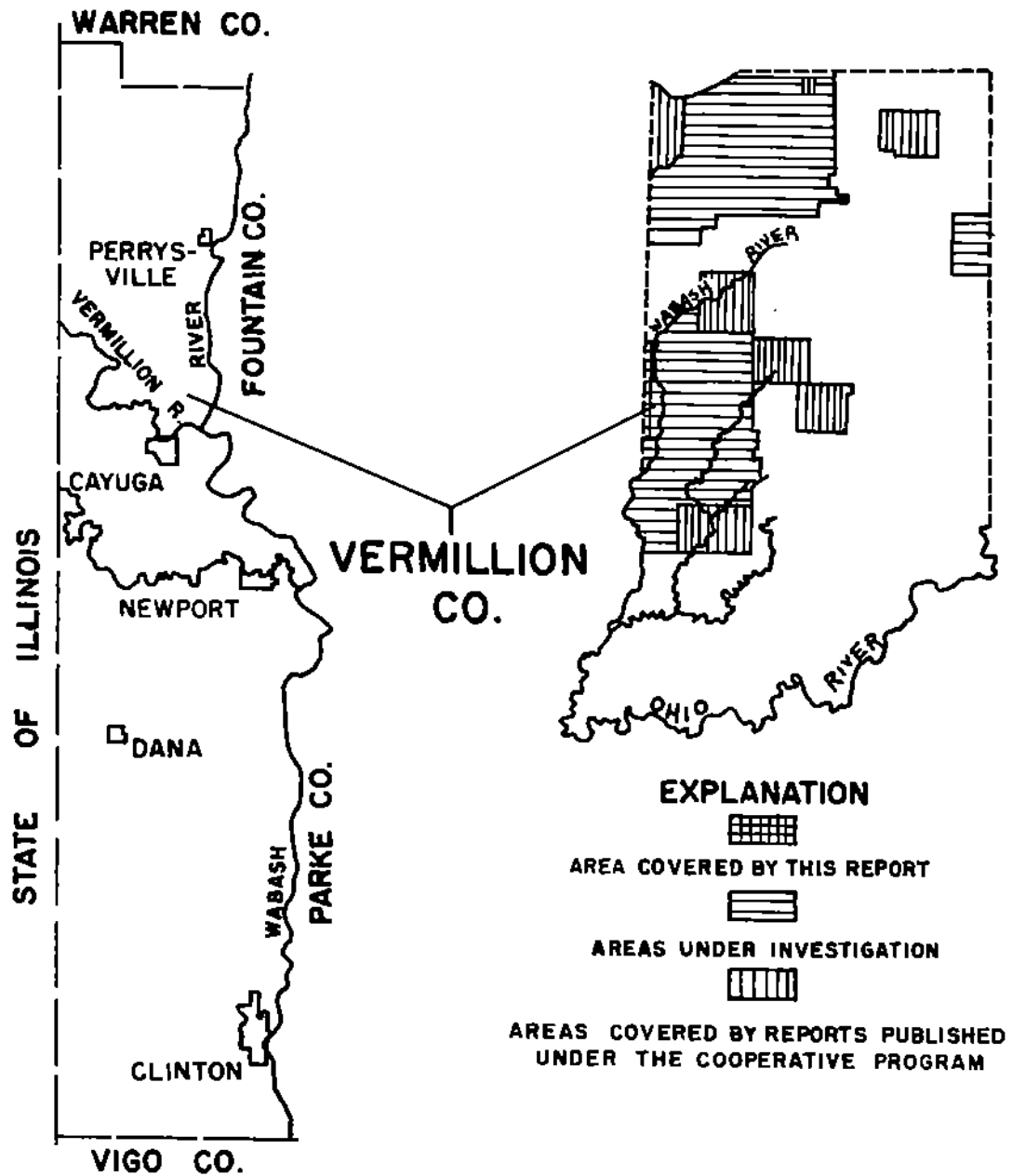
An investigation of the ground-water resources and geology of nine counties in west-central Indiana has been conducted intermittently since 1950. In 1956 the investigation was placed on a full-time basis and another county was added to the area of study. This investigation is being made by the U. S. 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 last of a series of 10 preliminary reports to be published on the ground-water resources and geology of west-central Indiana. The purpose of this 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 the geology as an aid to the development of the ground-water resources. A more detailed and comprehensive analysis 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 F. H. Klaer and C. M. Roberts, successive district geologists for Indiana.

### Location and Areal Extent

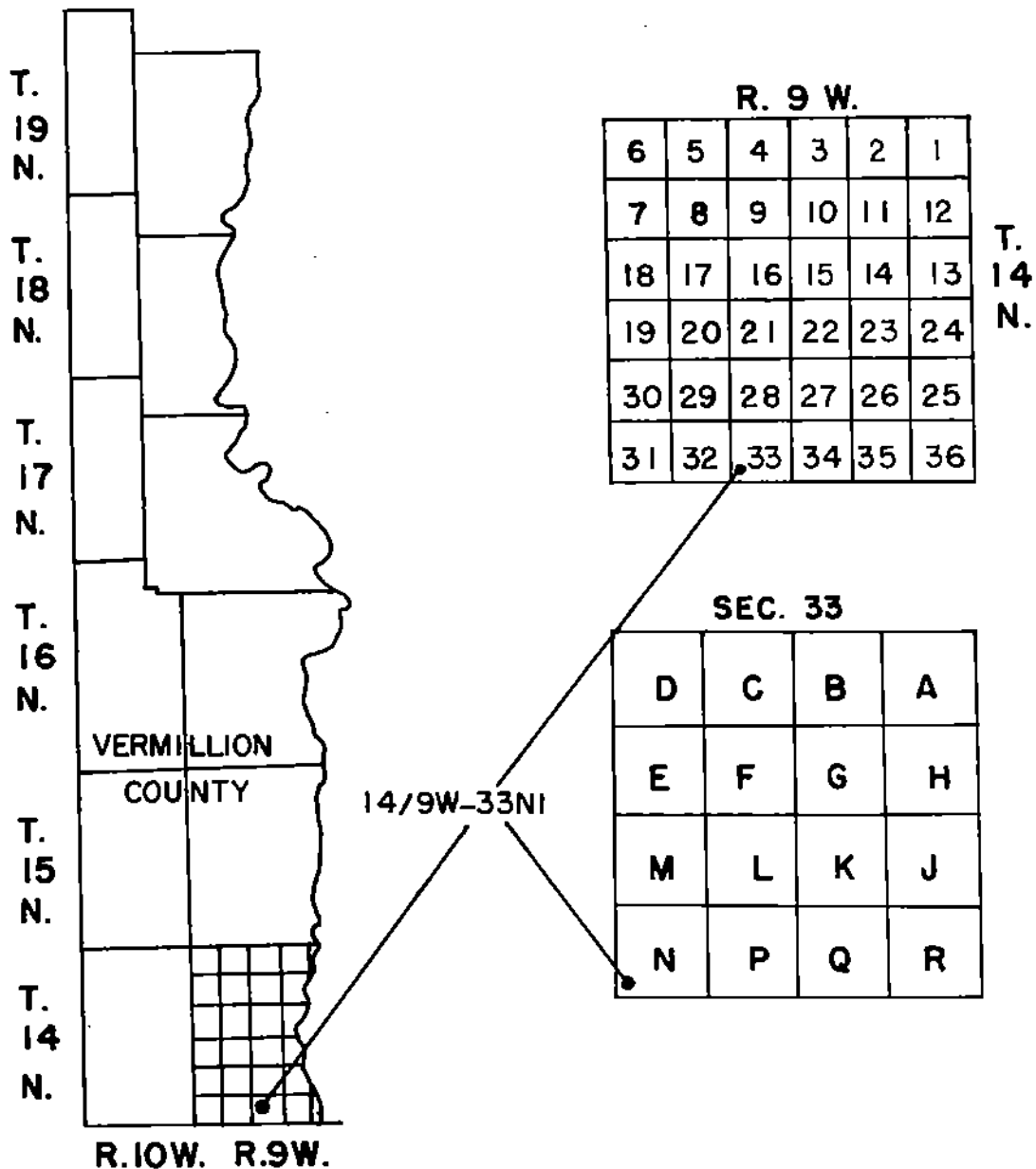
Vermillion County is in the west-central part of Indiana (fig 1). The county is roughly rectangular and has an area of about 263 square miles. It is bounded on the north by Warren County, on the east by Fountain and Parke Counties, on the south by Vigo County, and on the west by the State of Illinois.



**FIGURE 1.--** MAP OF INDIANA SHOWING AREA COVERED BY THIS REPORT, AREAS UNDER INVESTIGATION, AND AREAS COVERED BY REPORTS PUBLISHED UNDER THIS COOPERATIVE PROGRAM.

Well-numbering System

A numbering system is used to locate and identify the wells, holes drilled for purposes other than water supply, and springs in this report. The number assigned indicates the location according to the official rectangular survey of public lands. For example, in the number for well 14/9W-33N1, the part preceding the hyphen indicates that the well is in T. 14 N., R. 9 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 given a letter symbol as shown on figure 2. Within the quarter-quarter section, wells are numbered serially. Therefore, well 14/9W-33N1 is the first well listed in SW $\frac{1}{4}$ SW $\frac{1}{4}$  sec. 33, T. 14 N., R. 9 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. We especially thank the well drillers listed in the table of well records who furnished much of the information summarized in tables 4 and 5.

The authors also thank the following (state) agencies which provided information for the report: The Division of Oil and Gas, the Division of Water Resources, the Coal Section, and the Geophysics Section of the Geological Survey, all of the Indiana Department of Conservation; the Indiana State Highway Department; and the Illinois State Geological Survey Division.

## DATA COLLECTION AND PROCESSING

The well data were collected from drillers, water works superintendents, and others. The well records obtained from drillers were of two types----written records and reports from memory. A tentative driller's location of the well record was obtained at the time of collection and this was 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 well location was then checked in the field and its location plotted on the appropriate U. S. Geological Survey 7½-minute topographic quadrangle map. The locations given on the records of test holes, oil or gas exploration holes, and wells from other reports were accepted without further verification.

Plate 1 shows the location of water wells, test holes, or holes drilled for purposes other than water supply, springs, and stream sampling sites. All locations are accurate to the nearest quarter-quarter section and most locations are shown to the nearest 10 acres or quarter-quarter-quarter section. The basic data for these wells and holes drilled for purposes other than water supply are summarized in table 4. Selected drillers' logs of wells and other drilled holes with tentative interpretations by the authors of the geologic age of the materials encountered are given in table 5. Basic data for the springs are summarized in table 7.

Samples of water were collected at the time well and spring sites were visited and from streams during a period of low flow. The samples were analyzed in the field for hardness of water, alkalinity (expressed as bicarbonate) and chloride content by standard titration methods. Sulfate was determined by a turbidimetric method using a colorimeter where concentrations were below 100 ppm (parts per million) and by a standard titration method where concentrations exceeded 100 ppm. The iron content was determined at the well site by the bipyridine method by comparison with standard color ampules having known iron concentrations. The results of these analyses (tables 6, 7, and 8) were used to select sites for collecting water samples for more comprehensive analyses by the U. S. Geological Survey.

During the investigation an observation well was established to measure the fluctuations of water level. Table 9 contains water-level measurements obtained from this well. The data from this observation well show seasonal and longer term variations of the ground-water level.



## GENERAL GEOLOGY AND SOURCES OF GROUND WATER

Consolidated rocks of Early and Middle Pennsylvanian age crop out in Vermillion County. Overlying these rocks are unconsolidated glacial deposits of Pleistocene age.

Rocks of Early and Middle Pennsylvanian age form the bedrock surface of the county. The rocks are exposed in bluffs along the Wabash River and along streams flowing into the Wabash River. They consist chiefly of sandstone, shale, and minor amounts of coal, limestone, and fire clay. All these rocks are water-bearing to various degrees with the sandstones being the principal source of water. The rock of Pennsylvanian age is a major source of ground water for domestic and stock supplies in the county. Well depths range from about 50 to 550 feet, the most frequent depth being about 130 feet. Yields range from less than 1 to about 75 gpm (gallons per minute) with some dry holes reported.

Unconsolidated glacial deposits of Pleistocene age consisting of till and glaciofluvial sand and gravel overlie the consolidated rocks.

Preglacial streams eroded valleys in the bedrock surface in Vermillion County. Some of these valleys are followed in part by the present valleys of Little Raccoon and Brouilletts Creeks and by the Wabash River but the majority have been completely filled and buried by glacial materials and no surface expression remains.

Water-bearing sand and gravel, as much as 80 feet thick, has been penetrated by wells drilled into the deposits filling the preglacial valleys. These deposits may be lying on bedrock and overlain by till or Recent deposits or interbedded with till. The sand and gravel is not necessarily continuous--locally till, as much as 200 feet thick, may completely fill a preglacial valley.

Throughout the county there are relatively thin, irregularly shaped deposits of sand and gravel that are not associated with the sand and gravel filling the major preglacial valleys. Some are apparently tabular in shape covering several square miles whereas others are channel-like, a few tens of feet wide but possibly several miles long. The sand and gravel may be lying on bedrock, covered by till, or interbedded with till.

Well depths range from about 15 to 230 feet, the most frequent depth being about 65 feet. Yields from these sand and gravel deposits range from about 1 to 1,200 gpm. The saturated thickness and the grain size of the material in the deposits can change rapidly in a short distance, and are two factors controlling potential yield.

Yields sufficient for large industrial and municipal supplies are available from sand and gravel along most of the Wabash River and from the north-south trending preglacial channel west of Perrysville. Potential areas of high yield are the preglacial channels east and south of Universal and north and west of Dana. Yields sufficient for domestic, stock, and possible small industrial and municipal supplies are available from the thin irregularly shaped sand and gravel deposits present throughout much of the county.

Deposits of Recent age in Vermillion County consist mostly of flood-plain sediments, and wind-blown sand. They are thin and are not important as sources of ground water.

Plate 2 shows availability of ground water in the consolidated and unconsolidated rocks underlying the county.

The chemical content and the hardness of water vary greatly in the aquifers of Pennsylvanian and Pleistocene age. The maximum and minimum values and the mode <sup>1/</sup> for sulfate and chloride contents and hardness of water for these aquifers are given in table 1. Values for the mode are based on a small sampling and therefore may not be valid but compare closely with data from adjoining counties. In addition table 2 indicates the significance of the various constituents and properties of the water that are listed in tables 6, 7, and 8.

Table 1.--Comparison of quality of ground water by source in Vermillion County

Pleistocene aquifers			
	Sulfate ppm	Chloride ppm	Hardness ppm
Maximum-----	955	118	1,360
Minimum-----	10	<1	136
Mode-----	14	14	341
Pennsylvanian aquifers			
Maximum-----	900	3,140	916
Minimum-----	11	4	4
Mode-----	14	15	345

<sup>1/</sup> mode: The item, in a series of statistical data, which occurs oftenest. (Webster).

Table 2.--Significance of selected dissolved mineral constituents

and properties of ground water <sup>a/</sup>

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 <sub>3</sub> )-----	Bicarbonate in conjunction with carbonate (CO <sub>3</sub> ) 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 <sub>4</sub> )-----	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 in large amounts in combination with sodium. Increases the corrosiveness of water when in large amounts.
Hardness as CaCO <sub>3</sub> (Calcium 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.

CONFINED AND UNCONFINED CONDITIONS

In Vermillion County ground water occurs in the consolidated and unconsolidated rocks chiefly under confined (artesian) conditions, but in some places it occurs under unconfined (water-table) conditions. Under confined conditions, the aquifer (water-bearing material) is overlain directly by relatively impervious material, and the water, which is under pressure will rise in the well above the bottom of the impervious material. Under unconfined conditions the aquifer is overlain directly by permeable unsaturated material and the water does not rise above the level at which it is encountered.

<sup>a/</sup> After Rosenshein and Hunn (1961), p. 17

## TYPES OF WELLS

Drilled wells are the principal type of water wells used in Vermillion County. A small number of dug and driven wells are still in use and occasionally one is constructed. Most water wells are 4-inches or more in diameter and are constructed by the cable-tool or percussion method of drilling. A well drilled by the cable-tool method is constructed by a combination of drilling, bailing, and driving casing. Where the water-bearing material is consolidated rock, the well casing generally is driven a few inches to several feet into rock, and the well finished as an open hole in rock. Where the water-bearing material is sand and gravel, the well casing is driven into the water-bearing zone and either left as an open-end casing, or the lower end of the casing is slotted or perforated, or a well screen is set opposite the water-bearing zone below the end of the casing. A modification of the above type, the gravel-packed well, has a gravel lining between the well screen and the water-bearing material.

In Vermillion County the majority of industrial and municipal supply wells drilled in sand and gravel are equipped with well screens--a few are finished with slotted or perforated casing. Most domestic and stock wells that have been completed in sand and gravel do not have a screen but are finished with an open-end casing or the casing is slotted or perforated. The use of wire-wound, gauze-wrapped, or gauze-washer well points or screens in domestic and stock wells is becoming more widespread. Successful wells can be obtained by the use of screens in many water-bearing sand and gravel deposits from which it was once considered impossible to obtain water. Table 3 relates the grain-size in inches and millimeters to the slot and gauze size of screens commonly used in water wells.

Table 3.--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	-----	-----

In areas where the water level in the unconsolidated material is close to the surface some water wells are constructed by driving or digging. The driven well consists of a small diameter pipe with a drive-point screen on the end which is driven into shallow water-bearing material. The dug well is constructed by digging a hole, usually about 3 feet in diameter into the upper part of the water-bearing material and using concrete pipe, tile, brick, or stone as a casing.

The oil or gas exploration holes, test holes, and holes drilled for purposes other than water supply are drilled by either the cable-tool or rotary method in Vermillion County.

#### SUMMARY

Preliminary evaluation of the basic data shows that adequate quantities of ground water are generally available for domestic and stock use from the rocks of Pennsylvanian age.

Ground water for domestic, stock, and locally for industrial and municipal supplies is available from sand and gravel of Pleistocene age associated with preglacial bedrock valleys. Along most of the Wabash River and the preglacial channel west of Perrysville and possibly in the small areas near Universal and Dana large supplies are available from the aforementioned deposits. Ground water for domestic, stock, small industrial, and small municipal supplies may be available from thin irregularly-shaped sand and gravel deposits throughout much of the county.

The quality of the water from the rocks of Pennsylvanian and Pleistocene age varies greatly. Locally water from these sources may exceed the U. S. Public Health Service (1962) drinking-water standards for either iron, sulfate, or chloride content.

#### RECORDS

The records of about 245 water wells and holes drilled for purposes other than water supply are given in table 4. The table gives information about well construction, water levels, yields and drawdowns, thickness and character of the water-bearing material, conditions of occurrence, use, and other pertinent data. The altitude of the land surface at all wells, except oil or gas exploration holes, was determined from topographic maps. Altitudes of oil or gas exploration holes were on the records when received and were checked against the topographic maps.

Table 5 contains the selected logs of about 121 wells and other drilled holes. This table gives the drillers' description of the material encountered, pertinent remarks with regard to the material, and tentative interpretation by the authors of the geologic age of the material. The logs contain local terms used by drillers in describing the material penetrated. A glossary of drillers' terms is on page 12.

The results of 72 analyses of well waters are given in table 6. These chemical analyses were determined in the field by the U. S. Geological Survey. The table gives information about geologic source, temperature, concentration in parts per million of iron, alkalinity (expressed as bicarbonate), sulfate, and chloride contents, and hardness of water. The U. S. Public Health Service (1962) drinking-water standards state that the chemical constituents should not exceed the following concentrations: iron, 0.3 ppm; sulfate, 250 ppm; chloride, 250 ppm. Although no official standards have been established for hardness of water, the following classification (Lamar, 1942, p. 25, 26) is in general use: 0-60 ppm, soft; 61-120 ppm, moderately hard; 121-200 ppm, hard; more than 200 ppm, very hard.

Records of 5 springs are given in table 7. This table gives geologic source, yield, use, temperature of water, and the results of field chemical analyses.

Table 8 gives the results of 10 field chemical analyses of water from streams in Vermillion County with other data.

Water levels in 1 observation well in Vermillion County are given in table 9. The water levels were measured with a recording gage. Daily high water levels are given for the observation well. The location of this observation well is shown on plate 1.

## GLOSSARY OF DRILLERS' TERMS

Band.--Thin shale or clay associated with coal.

Blackjack.--Black carbonaceous shale or a clayey or shaly coal.

Bluestone.--Blue-gray siltstone, sandy shale, or shaly sandstone.

Bone coal.--See blackjack.

Chip slate.--Very hard shale which breaks into small, thin, angular pieces.

Dark band.--See band.

Drift.--Any rock material, such as boulders, till, gravel, sand, or clay, transported by a glacier and deposited by or from ice or by or in water derived from the melting of the ice.

Hardpan.--A hard impervious layer, composed chiefly of clay, cemented by relative insoluble materials, does not become plastic when mixed with water.

Pan.--Clay of glacial origin; generally contains small pebbles and occasional boulders.

Shell.--Thin and usually hard layers of rock; rock which splits in thin pieces parallel with the bedding surface.

Slate.--Hard shale which splits into thin platy fragments, usually black.

Smut.--Soft coal containing much earthy matter.

Soapstone.--Hard smooth clay or shale, slippery to the touch.

Softpan.--Hard impervious layer composed chiefly of clay, partially cemented by relative insoluble materials, becomes plastic when mixed with water.

Sulfur.--Thin band or layer of pyrite in a coal seam.

Wash.--Water laid glacial material consisting of sand, silt, and clay with a high percentage of twigs, leaves, and other organic material.

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Table 4.--Records of wells, Vermillion County, Indiana

Well number: See text for description of well-numbering system.  
 Altitude: Altitude of land-surface datum from topographic map.  
 Type of well: Dr, drilled; Dn, driven; Du, dug; J, jetted.  
 Finish: Gp, gravel pack; Co, open end; Oh, open hole; P, perforated casing; S, screen.  
 Material: G, gravel; Ls, limestone; S, sand; Ss, sandstone; Sd-sh, sandy shale; Sd-t, sandy till; Sh, shale; Sh-sh, shaly sandstone.  
 Geologic age: Pl, Pleistocene; P, Pennsylvanian.  
 Ground-water occurrence: C, confined (artesian); U, unconfined (water table).

Well No.	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land surface (feet)	Diameter (inches)	Depth of casing (feet)	Finish	Depth to top (feet)	Water-bearing zone				Yield (gpm)	Water level (feet)	Remarks
											Thickness (feet)	Material	Geologic age	Ground-water occurrence			
14/9W-3E1	Town of Fairview Park	Layne-Northern Co., Inc.	1949	505	Dr	125	8	---	Oh	---	---	P	---	87	P	L; Reported sulfur water	
3E2	---	---	1949	505	Dr	125	8	---	Oh	---	---	P	---	87	P	L; Reported sulfur water	
4W1	Brazil Block Coal Co.	---	1898	500	Dr	267	---	---	---	---	---	P	---	---	T	N	L; Reported salt water
4P1	T. Barnes	L. Adkins	1942	522	Dr	64	0	64	---	---	---	P	---	---	N	L; Reported sulfur water	
4P2	H. Cline	---	1942	515	Dr	90	0	---	P	78	P	P	---	---	Dn	L; Reported sulfur water	
9B1	L. Akre	---	9-23-42	505	Dr	35	0	39	Oh	45	P	P	---	---	N	L; Reported sulfur water	
10C1	Veitli Bros. Packing Co.	---	11-42	500	Dr	130	4	---	---	---	---	P	---	---	P	Ls; Dd 9 ft pumping at 1,000 gpm; Screen, 25 ft of 18-in dia, no. 6 shutter	
10D1	City of Clinton	Layne-Northern Co., Inc.	5-12-47	500	Dr	104	38	104	S	38	S	P	---	38	P	Ls; Dd 10 ft pumping at 1,000 gpm; Screen, 25 ft of 18-in dia, no. 6 shutter	
10P2	---	---	6-11-46	500	Dr	130	6	---	---	25	S	P	---	25	T	Ls; Dd 10 ft pumping at 1,000 gpm; Screen, 25 ft of 18-in dia, no. 6 shutter	
10P3	---	---	7- 2-47	500	Dr	102	18	100	S	32	S	P	---	32	P	Ls; Dd 10 ft pumping at 1,000 gpm; Screen, 25 ft of 18-in dia, no. 6 shutter	
10P4	---	---	6-18-46	500	Dr	131	6	---	---	32	S	P	---	32	T	Ls; Dd 10 ft pumping at 1,000 gpm; Screen, 25 ft of 18-in dia, no. 6 shutter	
10E1	T. Fenoglio	---	1940	500	Dr	80	5	---	---	---	S, G	P	---	---	P	Data from owner; Water temperature 56°F	
10W1	Almona Dross, Dairy	Smith Bros.	10-17	505	Dr	78	8	78	P	43	P	P	---	43	I	A; Reported Dd 0 ft after 6 hr pumping at 100 Kpa	
15G1	R. Shaver	L. Adkins	10-42	490	Dr	78	8	78	P	---	P	P	---	---	A	L; Dd 2 ft after 3 hr pumping at 20 Kpa	
22Q1	H. L. Chook	P. E. Larrabou	7- 8-52	490	Dr	66	3	66	S	40	S	P	---	40	D	Reported Dd 0 ft after 2 hr bailing at 35 Kpa; Screen, 4 ft of 6-in dia, no. 50 slot	
27C1	Mr. Chook	---	10-12-60	485	Dr	57	6	57	S	32	S	P	---	32	I	Reported Dd 0 ft after 2 hr bailing at 35 Kpa; Screen, 4 ft of 6-in dia, no. 50 slot	
27E1	Y. Alkire	---	1952	480	Dr	66	3	60	S	40	C	P	---	40	D	A; Data from owner	
29H1	Brazil Block Coal Co.	---	6-98	570	Dr	108	---	---	---	---	---	---	---	---	T	L	L
29Q1	---	---	6-96	480	Dr	170	---	---	---	---	---	---	---	---	T	L	L
29R1	---	---	1896	550	Dr	87	---	---	---	---	---	---	---	---	T	L	L
30R1	U. S. Coal & Coke Producers	---	1-28-09	480	Dr	254	---	---	---	---	---	---	---	---	T	L	L
31C1	---	---	2-13-00	570	Dr	55	---	---	---	---	---	---	---	---	T	L	L
31G1	S. Secondino	---	1953	510	Dr	30	8	30	---	---	S	P	---	---	S	A; Data from owner	
31H1	U. S. Coal & Coke Producers	---	1-12-08	511	Dr	284	---	---	---	---	---	---	---	---	T	L	L
31L1	---	---	5-08	518	Dr	300	---	---	---	---	---	---	---	---	T	L	L
32K1	Brazil Block Coal Co.	---	12- 6-36	500	Dr	104	---	---	---	---	---	---	---	---	T	L	L
32L1	U. S. Coal & Coke Producers	---	3-13-39	488	Dr	244	---	---	---	---	---	---	---	---	T	L	L



Table 4.--Records of wells, Vermillion County, Indiana--Cont.

Well No.	Owner	Driller	Date completed	Altitude (feet)	Type of well	Depth of well below land surface (feet)	Diameter (inches)	Depth of casing (feet)	Plat	Water-bearing zone					Water level (feet)	Yield (gpm)	Use	Remarks
										Thickness (feet)	Material	Geologic age	Ground-water occurrence	Depth to top (feet)				
15/10W-34N1 35D1	W. Jordan & Coko U. S. Coal & Coke Producers		1-23-09	570	Dr	35		35	Oo		10	S, G	P1		20	D, S	Data from owner L	
35N1	A. Jaab	M. O. Schneider		610	Dr	358										T	L; Dd 150 ft after 2 hr bailing at 5 rpm	
16/ 9W- 3D1	D. Ilargor	F. E. Larrabee	12-18-00	630	Dr	185	6	102	Oh		83	Sa	P		20	S	Lam, A	
3N1	Vermillion County Home			630	Dr	140	6	70	Oh		70	Sa	P		15	B	Lam, A	
11N1	Arketek Ceramic Corp.	W. L. Loughlin	8-48	520	Dr	84	5	26	Oo		25	S, G	P1		25	P	Lm, A; Dd 25 ft pump- ing at 30 rpm	
14C1	O. McMaster	K. Crabb	1858	480	Dr	72	4	72	Oo		135	Sa	P		4	D, S	L	
15N1	R. Parks	F. E. Larrabee		620	Dr	152	0		Oh		17	Sa	P			S	L	
22L1	Cains Brick School	L. Adkins	1942	650	Dr	51	4	51	P		6	S, G	P1			P	L (partial), A	
22P1	G. Gaddin		1942	850	Dr	61	0	61	P, Oh		52	G	P1			N	L	
30Q1	Indiana State Highway Department	C. B. Riark	9- 4-41	630	Dr	250	6		Oh		15	Sh	P		75	P	L	
30R1	E. Rodman	F. E. Larrabee		630	Dr	120	6	120	Oo		9	S, G	P1			D	L, A; Dd 20 ft after 2 hr pumping at 10 rpm	
31A1	F. Kover		11- 2-61	630	Dr	95	0	95	Oo		3	G	P1			I	L, A; Dd 6 ft pumping 30 gpm; Screens set in both gravel and sandstone	
32P1	E. A. Doud	Mingo & Son	3-47	640	Dr	103		80	S		78	G	P1			P	Lm, A; Reported salt water in upper sandstone; soda water in lower sandstone	
34H1	Ohio Oil Co.	A. L. Stico	1948	590	Dr	550	6	60	Oh		117	Sa	P		80	P	Dry hole Lam Do	
16/10W- 4F1	M. Roe	M. Crabb	6-53	625	Dr	185	4	77	Oh							De	Lam Do	
4F2			6-53	625	Dr	206	4	77	Oh							De	Lam Do	
6J1	A. J. Walther	F. O. Warrick		640	Dr	320	4		Oh							De	L; Dry hole	
9F1	T. Meyers	L. Adkins	1- 4-43	625	Dr	360										T	L	
22G1	Bon Ayr Coal Co.		1935	630	Dr	533										N	La	
23P1	U. S. Government	H. J. Brenner	1950	625	Dr	148	4	146	Oo		2	S	P1		108	N	La	
26G1	Town of Dana	Sies Drilling Co.		850	Dr	78	12									60	P	Dd 2 ft after 12 hr pump- ing at 42 rpm
26H1				850	Dr	80	12									50	P	
20H2			1951	650	Dr	387										80	P	
26U3			1951	640	Dr	387	10									40	P	
26Q1	W. Marshall			640	Dr	17			Oo		8	G, S	P1		7	P	A	
26Q2	Y. C. Sims			640	Dr	190	6	75	Oh		10	S, G	P1			P	A	
27C1	E. Rodman	F. E. Larrabee		630	Dr	177		147	Oo		147	G	P1			D, S	A	
34Q1				635	Dr	127		72	Oo		72	G	P1			D, S	A	
36F1				650	Dr	127		127	P		7	S, G	P1			S	A	
17/ 9W- 4F1	Town of Cayuga	Sies Drilling Co.	3-11-54	490	Dr	168	10	100	Gp		30	S, G	P1		21	P	L; Dd 8 ft pumping at 250 gpm	
4L1	New York, Chicago, and St. Louis Railroad	Layno-Northern Co., Inc.	11- 8-30	499	Dr	75	12	75	S		34	S, G	P1		28	O	L, G, W; Observation well Vermillion 1; Dd 4 ft pumping at 300 gpm; Screen, 12 ft of no. 125 plot	
5H1	K. Jarnaman	M. Crabb	1951	490	Dr	39	4	39	Oo		14	S, G	P1		14	D, S	A	
5L1	Town of Cayuga		1924	610	Dr	15	42	15	Oo							N	N	
5Q1	Morgan Canning Co.			513	Dr	17	30	17	Oo							N	N	
6F1	W. H. Patrick	W. L. Laughlin	11-51	573	Dr	150	6	51	Oh		140	Sh	P			S	L, A; Dd 50 ft after 5 hr pumping at 6 gpm	
8Q1	E. Edwards	Sutherland Bros.	3-47	590	Dr	225	7	27	Oh		24	S, G	P1			I	L; Dry hole	
8D1	Cayuga Clay Co.	F. Holdreider		550	Dr	27	14	27	S							I	Lm, A; Well used for drinking water	
9P1	Wright Ice Cream Co.	Sutherland Bros.	3-47	520	Dr	46	0	46	Oo							I	A	
9H1	J. Wright	M. Crabb	1951	530	Dr	48	4	48	S							D	A	





19/ 9W-10Q1	Swallow, Bookwalter, Phillips, et al	Swallow, Bookwalter, Phillips, et al	485	Dr	208	4	Oh	80	30	Sh	P	C	T	L
13A1	The Maples, et al	F. O. Marrick	500	Dr	90	4	Oh	94	16	Sh	P	C	D	A
13A2	C. Brown	do	170	Dr	45	4	Oh	94	16	Sh	P	C	D	La
13E1	E. Brummett	do	820	Dr	45	4	S	---	---	S	Pl	---	N	A: Casing set on top of rock, Water from sand
13E2	R. Fortner	do	810	Dr	61	4	Oh	---	---	S	Pl	---	N	A: Casing set on top of rock, Water from sand
16A2	W. Millor	do	610	Dr	260	4	Oh	204	56	Sh	P	C	D,S	A
16R1	Q. Meyers	7-48	620	Dr	230	6	Oh	208	7	Sh	P	C	S	L
18E1	Illiana Farm	W. L. Laughlin	825	Du	26	72	Oh	215	35	54-sh	Pl	---	D,S	A: Data from farm manager
19N1	Swallow, Bookwalter, Phillips, et al	do	590	Dr	284	---	---	---	---	---	---	---	T	L
20E1	D. M. Hanna	do	520	Du	24	36	Oh	---	---	---	---	---	D,S	Data from owner
20G1	A. Morgan	do	820	Du	25	36	Oh	24	1	9,G	Pl	C	D,S	A: Hardpan to 24 ft
21K1	W. Morgan	2-20-53	835	Du	260	---	---	---	---	---	---	---	D,S	L, A: Can pump dry
22N1	Swallow, Bookwalter, Phillips, et al	do	847	Dr	281	---	---	---	---	---	---	---	T	L
27D1	T. Carter	11-12-51	560	Dr	128	6	Oh	118	10	Sh	P	C	D	L, A: Dd 9 ft after 2 hr pumping 10 gpm
27M1	F. Allen	do	535	Dr	130	5	Oh	125	5	Sh	P	C	T	L
28G1	Swallow, Bookwalter, Phillips, et al	6-47	551	Dr	229	---	---	---	---	---	---	---	T	L
28J1	A. Morgan	11-23-47	547	Dr	1,020	---	---	---	---	---	---	---	Og	W. Morgan 1; La
28P1	Town of Perryville	12-31-61	540	Dr	100	6	Oh	50	50	S,G	Pl	---	P	L: Screen, 15 ft of 6-in dia, 3 ft no. 40 slot; Dd 12 ft after 8 hr pumping at 180 gpm
29R1	Z. Nail	8-52	500	Dr	87	4	Oh	75	12	Sh	P	C	D	A: Dd 10 ft pumping at 4 gpm
29R2	M. Jones	do	500	Dr	84	4	Oh	40	44	Sh	P	C	D	L: Dd 5 ft pumping at 4 gpm
29F1	H. Chrysler	8-23-50	825	Dr	228	0	Oh	201	27	G,S	Pl	C	S	L, A
29F2	R. Chrysler	12-15-50	810	Dr	272	---	---	250	72	Sh	P	U	N	L, A
29N1	R. Hicks	3-23-53	820	Du	140	4	Oh	123	15	S,G	Pl	---	D,S	L, A
30N1	B. S. Lorch	1892	860	Du	17	---	---	---	---	---	---	---	T	Data from owner
31B1	Swallow, Bookwalter, Phillips, et al	do	598	Dr	398	---	---	---	---	---	---	---	T	L
31R1	H. Gracch	3-22	590	Dr	149	4	Oh	114	35	G	Pl	C	D	L, A
32H1	Mr. Kelly	do	560	Dr	2,442	---	---	---	---	---	---	---	Og	Swallow, Bookwalter, Phillips, et al 1;
32N1	J. Lawson	12-27-48	564	Dr	1,038	---	---	---	---	---	---	---	Og	La
32A1	J. Sanders	8-47	550	Dr	80	6	Oh	60	15	Sh	P	C	N	W. Morgan 1; La
32A2	R. Winters	5-47	545	Dr	54	---	---	---	---	---	---	---	N	L, A
32A3	R. Crowder	6-21-50	535	Dr	115	6	Oh	100	15	Sh	P	C	D	L, A: Dd 10 ft after 12 hr pumping 7 gpm
32A4	Mr. Sproul	7- 4-50	535	Dr	135	6	Oh	115	20	Sh,Sh	P	C	I	L, A
32A5	F. Criss	8-47	535	Dr	154	6	Oh	136	18	Sh	P	C	D	L, A
32B1	Mrs. Sullivan	8-47	550	Dr	122	6	Oh	---	---	---	---	---	D	L, A
32B2	L. Summers	7-47	550	Dr	79	6	Oh	---	---	---	---	---	D	L, A
32B3	B. H. Courtney	2- 9-53	550	Dr	125	4	Oh	---	---	---	---	---	D	L, A
32B2	R. Smith	7-17-51	530	Dr	122	6	Oh	112	10	Sh	P	C	D	L, A
34D1	Town of Perryville	7-53	490	Dr	104	8	Oh	---	---	---	---	---	N	Dd 40 ft pumping at 40 gpm
34D2	G. Lewis	10-47	530	Dr	84	6	Oh	---	---	---	---	---	D	L, A: Reported Dd 0 ft
19/10W- 9A1	C. White	4-18-52	635	Dr	154	4	Oh	147	7	Sh	P	C	D	L, A: Dd 165 ft pump- ing 3 gpm; Reported salt water
17D1	Indiana State Highway Department	7-11-58	647	Dr	27	---	---	---	---	---	---	---	T	L
17D2	do	7-11-58	647	Dr	22	---	---	---	---	---	---	---	T	La
17K1	D. Feather	9-24-53	640	Dr	305	4	Oh	180	60	Sh	P	C	D,S	L, A: Dd 165 ft pump- ing 3 gpm; Reported salt water
18A1	Indiana State Highway Department	7-11-58	647	Dr	27	---	---	---	---	---	---	---	T	L
18A2	do	7-11-58	647	Dr	22	---	---	---	---	---	---	---	T	La
18A3	do	7-11-58	647	Dr	27	---	---	---	---	---	---	---	T	La
20E1	R. Carrigan	do	645	Du	30	36	Oh	---	---	S	Pl	---	N	Clay to 30 ft; Data from owner
20E2	K. Carrigan	do	645	Du	15	36	Oh	15	15	S	Pl	C	D	A: Clay to 15 ft; Data from owner
28J1	R. Clugon	1844	620	Du	35	---	---	---	---	S,G	Pl	C	D	A: Data from owner
31K1	P. Kenna	do	640	Du	19	---	---	---	---	S,G	Pl	C	D	Gravelly clay to 18 ft; Data from owner
32Q1	F. Davis	8-59	810	Dr	101	4	---	---	---	---	---	---	D	A: Data from owner

Table 5.--Selected well logs, Vermillion County, Indiana

Remarks: T. D., total depth in feet, complete log  
not given; W. B., water bearing

Well 14/9W-4N1

Type of record: Driller's log.

Altitude: About 590 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Sand and gravel-----	10	10	W. B.
Hardpan, soft-----	16	26	
Sand and gravel, dry-----	10	36	
Sand and gravel-----	16	52	
Quicksand-----	4	56	
Drift-----	33	89	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, dark-----	25	114	
Slate, black-----	2	116	
Coal-----	1.2	117.2	
Fire clay and rock-----	3.8	121	
Shale, dark-----	14	135	
Coal-----	1	136	
Slate, chip, black-----	3.8	139.8	
Coal-----	4.8	144.6	
Fire clay-----	2.4	147	
Shale rock-----	4	151	
Sandstone-----	8	159	
Shale, light-----	14	173	
Slate, black-----	6	179	
Shale, light-----	21	200	
Slate, black-----	4	204	
Coal-----	2	206	
Fire clay-----	3	209	
Shale, limy-----	8	217	
Shale, light-----	16	233	
Shale, brown-----	27	260	
Coal-----	5	265	
Fire clay-----	1.7	266.7	

Well 14/9W-4P2

Type of record: Driller's log.

Altitude: About 515 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	4	4	
Sand-----	24	28	
Hardpan-----	27	55	
Sand, fine, white-----	3	58	
Hardpan-----	20	78	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	12	90	W. B.

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-9B1

Type of record: Driller's log.

Altitude: About 505 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	4	4	
Sand-----	31	35	
Boulders-----	2	37	
Gravel-----	5	42	
Clay-----	3	45	
Sand and gravel-----	14	59	W. B.

Well 14/9W-10C1

Type of record: Driller's log.

Altitude: About 500 feet.

Fill-----	10	10	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale-----	52	62	
Slate, black-----	10	72	
Shale, light-----	6	78	
Shale, sandy-----	40	118	
Shale, blue-----	6	124	
Slate, black-----	6	130	

Well 14/9W-10D4

Type of record: Driller's log.

Altitude: About 500 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Soil and gritty dirt-----	12	12	
Sand and gravel, fine-----	18	30	
Gravel, fine-----	10	40	W. B. 32 to 130 ft
Gravel, medium-----	15	55	
Sand and gravel, coarse-----	25	80	
Sand and gravel, coarse-----	10	90	Cloudy
Sand and gravel, coarse-----	5	95	
Gravel, fine-----	25	120	
Sand and gravel, coarse-----	10	130	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Rock, hard-----	1	131	

Well 14/9W-15G1

Type of record: Driller's log.

Altitude: About 490 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Gravel-----	39	49	
Sand-----	4	53	
Sand and gravel, coarse-----	25	78	



Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-29H1

Type of record: Driller's log.

Altitude: About 570 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	3	3	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Sandstone-----	27	30	
Shale, light-----	30	60	
Slate, dark-----	12	72	
Slate, black-----	1	73	
Coal-----	.8	73.8	
Fire clay-----	2	75.8	
Slate, gray-----	17.5	93.3	
Slate, hard, black-----	4	97.3	
Coal-----	4.7	102	
Fire clay-----	6	108	

Well 14/9W-29Q1

Type of record: Driller's log.

Altitude: About 490 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface and gravel-----	5	5	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, blue-----	24	29	
Slate, dark-----	9.8	38.8	
Coal-----	2	40.8	
Fire clay-----	3.2	44	
Shale, white-----	10	54	
Slate, black-----	6.8	60.8	
Coal and slate-----	2.5	63.3	
Sulfur and slate-----	.7	64	
Coal-----	5.2	69.2	
Fire clay-----	4.8	74	
Shale, light-----	16	90	
Slate, dark-----	15	105	
Shale, light-----	15	120	
Slate, dark-----	5	125	
Coal-----	2	127	
Fire clay-----	4	131	
Shale, light-----	4	135	
Shale, limy-----	4	139	
Shale, sandy, light-----	12	151	
Shale, brown-----	11.7	162.7	
Coal-----	5.7	168.4	
Fire clay, soft-----	.5	168.9	
Fire clay, hard-----	1	169.9	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-30R1

Type of record: Driller's log.

Altitude: About 480 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Loam, sandy-----	8	8	
Sand-----	9	17	
Gravel-----	6	23	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale-----	1	24	
Shale, sandy-----	22	46	
Shale, soft, blue-----	9.7	55.7	
Shale, dark-----	10	65.7	
Coal-----	1.5	67.2	
Fire clay-----	5	72.2	
Limestone-----	.8	73	
Limestone and shale-----	1.5	74.5	
Shale, soft, dark-----	4.5	79	
Limestone, broken-----	1	80	
Shale, dark-----	6	86	
Slate, hard, black-----	1	87	
Slate, black-----	3.6	90.6	
Coal-----	4.7	95.3	
Fire clay-----	4.5	99.8	
Conglomerate-----	1	100.8	
Shale, sandy-----	7.2	108	
Sandstone-----	4	112	
Shale, blue-----	8.3	120.3	
Shale, dark, and brown bands-----	23.7	144	
Shale, blue-----	8.5	152.5	
Slate, black-----	1.9	154.4	
Sulfur-----	.3	154.7	
Shale-----	.5	155.2	
Coal-----	2	157.2	
Fire clay-----	3.6	160.8	
Shale, sandy-----	3.3	164.1	
Limestone-----	4.4	168.5	
Shale, soft-----	3.1	171.6	
Shale, sandy-----	10.4	182	
Shale, blue, with hard bands-----	5.6	187.6	
Coal-----	4.6	192.2	
Shale, sandy-----	21.8	214	
Shale, blue, with hard bands-----	4.7	218.7	
Slate, black-----	6.3	225	
Coal-----	1.3	226.3	
Fire clay-----	2.5	228.8	
Sand shale-----	16.4	245.2	
Shale, blue-----	1.6	246.8	
Coal-----	3.3	250.1	



Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-31L1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Coal-----	.9	137.9	
Slate, black-----	4.2	142.1	
Coal-----	4.8	146.9	
Fire clay-----	2.1	149	
Limestone-----	5	154	
Shale, limy-----	6	160	
Shale, blue-----	22	182	
Shale, light-----	8	190	
Shale, brown-----	14	204	
Slate, black-----	1	205	
Rock, hard-----	1	206	
Slate, black-----	2.5	208.5	
Coal-----	1.8	210.3	
Fire clay-----	3.7	214	
Sand rock-----	8	222	
Slate, light-----	6	228	
Slate, gray-----	9	237	
Slate, soft, black-----	.6	237.6	
Coal-----	5.4	243	
Shale, sandy-----	2	245	
Sand rock-----	6	251	
Sand shale-----	6	257	
Shale, blue-----	11.5	268.5	
Slate, black-----	7	275.5	
Coal-----	1	276.5	
Fire clay-----	2	278.5	
Shale, blue-----	4	282.5	
Sand rock-----	4	286.5	
Slate, blue-----	12.7	299.2	
Coal-----	6	305.2	
Fire clay-----	1.3	306.5	

Well 14/9W-32K1

Type of record: Driller's log.

Altitude: About 500 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface and sand-----	52	52	
Clay, blue-----	45	97	
Sand and gravel-----	7	104	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-32L1

Type of record: Driller's log.

Altitude: About 489 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Soil-----	1.5	1.5	
Clay-----	2.5	4	
Sand and gravel-----	17	21	
Boulder-----	.2	21.2	
Sand-----	19.8	41	
Clay, sandy-----	23.5	64.5	
Sand with coal-----	13.5	78	
Gravel-----	3.5	81.5	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale-----	2.5	84	
Sand shale-----	12.1	96.1	
Shale, blue, hard benches-----	38.9	135	
Shale, black-----	2.9	137.9	
Sulfur-----	.1	138	
Coal-----	1.7	139.7	
Sulfur-----	.1	139.8	
Coal-----	.5	140.3	
Fire clay-----	3.9	144.2	
Sand and limestone-----	6.8	151	
Shale, soft, blue, with hard bands-----	2.7	153.7	
Shale, blue-----	5.3	159	
Shale, blue, with hard bands-----	19.9	178.9	
Coal-----	4.7	183.6	
Fire clay-----	.4	184	
Sand shale-----	1	185	
Shale, blue-----	18.2	203.2	
Limestone-----	.3	203.5	
Shale, black-----	7.9	211.4	
Coal-----	.1	211.5	
Shale and sulfur-----	.6	212.1	
Coal-----	1.4	213.5	
Fire clay-----	1.5	215	
Sandstone-----	4	219	
Shale-----	3.7	222.7	
Shale, sandy-----	10.3	233	
Shale, blue-----	3.9	236.9	
Coal-----	5.9	242.8	
Fire clay-----	1.2	244	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-33B1

Type of record: Driller's log.		Altitude: About 590 feet.	
Material	Thick-ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface sand-----	3	3	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Soapstone-----	11	14	
Shale, light-----	41	55	
Slate, dark-----	14	69	
Slate, black, and smut-----	2.5	71.5	
Fire clay-----	5	76.5	
Slate, dark-----	7.5	84	
Slate, black-----	10.5	94.5	
Coal-----	4.3	98.8	
Fire clay-----	1.2	100	

Well 14/9W-33G1

Type of record: Driller's log.		Altitude: About 530 feet.	
Quaternary System:			
Recent and Pleistocene Series:			
Surface sand-----	4	4	
Hardpan-----	24	28	
Drift-----	2	30	
Gravel-----	1.5	31.5	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	30.5	62	
Slate, dark-----	12	74	
Chip slate, dark-----	3	77	
Clay, soft-----	3	80	
Shale, light-----	6	86	
Slate, dark-----	10.5	96.5	
Chip slate, black-----	4	100.5	
Coal-----	4.7	105.2	
Clay-----	.5	105.7	

Well 14/9W-33L1

Type of record: Driller's log.		Altitude: About 575 feet.	
Quaternary System:			
Recent and Pleistocene Series:			
Sand-----	32.4	32.4	
Clay-----	5	37.4	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale-----	7	44.4	
Coal-----	2.2	46.6	
Rock-----	.4	47	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-33L1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate-----	1.2	48.2	
Sandstone-----	1.4	49.6	
Slate-----	1.2	50.8	
Coal-----	4	54.8	

Well 14/9W-33L5

Type of record: Driller's log.

Altitude: About 520 feet.

Quaternary System:		
Recent and Pleistocene Series:		
Surface-----	8	8
Hardpan-----	1.5	9.5
Sand and gravel-----	3	12.5
Pennsylvanian System:		
Middle Pennsylvanian Series:		
Shale, blue-----	22	34.5
Shale, gray-----	12	46.5
Shale, brown-----	16	62.5
Slate, black-----	1.3	63.8
Coal-----	1.4	65.2
Fire clay-----	1.6	66.8
Shale, light-----	4	70.8
Slate, black-----	14.8	85.6
Sulfur rock-----	1	86.6
Slate, black-----	.2	86.8
Coal-----	5.3	92.1
Fire clay-----	2.9	95
Slate, sandy-----	1	96
Limestone-----	1.5	97.5
Slate, brown-----	6	103.5
Sandstone-----	9.5	113
Shale, dark-----	30	143
Slate, black-----	3	146
Coal-----	2	148
Fire clay-----	6	154
Limestone-----	3.5	157.5
Slate, sandy-----	13	170.5
Shale, sandy-----	13	183.5
Slate, blue-----	3	186.5
Slate, brown-----	1.7	188.2
Coal-----	5	193.2
Slate, brown-----	25	218.2
Slate, black-----	4	222.2
Coal-----	1	223.2
Sandstone-----	7.3	230.5
Slate, sandy-----	15.5	246
Coal-----	5.8	251.8

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-33L5--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Bone coal-----	0.4	252.2	
Fire clay-----	3.3	255.5	
Coal-----	1	256.5	
Fire clay-----	1.5	258	
Slate, sandy-----	2	260	
Slate, black-----	4	264	
Limestone-----	4	268	
Fire clay-----	1	269	
Sandstone-----	10	279	
Slate, black-----	5	284	
Slate, sandy-----	10	294	
Lower Pennsylvanian Series:			
Slate, black-----	.5	294.5	
Coal-----	1	295.5	
Fire clay-----	2	297.5	
Slate, sandy, dark-----	12	309.5	
Limestone-----	5	314.5	
Slate, black-----	.3	314.8	
Coal-----	4.2	319	
Fire clay-----	5	324	
Sandstone-----	16	340	
Limestone-----	3	343	
Slate, black-----	7.5	350.5	
Sulfur-----	.5	351	
Coal-----	2.8	353.8	
Fire clay-----	.4	354.2	
Sandstone-----	----	354.2	

Well 14/9W-33N1

Type of record: Driller's log.

Altitude: About 600 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface clay, yellow-----	20	20	
Hardpan, gray-----	30	50	
Pumice sand in blue hardpan-----	8	58	W. B.
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Limestone, soft, gray-----	3	61	W. B.
Shale, blue-----	39	100	
Shale, sandy, light-----	40	140	



Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/9W-33R1

Type of record: Driller's log.

Altitude: About 470 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface clay-----	2	2	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Soapstone-----	21	23	
Shale, dark-----	49	72	
Slate, black-----	16	88	
Coal and slate-----	2	90	
Fire clay-----	4	94	
Shale, hard-----	2	96	
Slate, blue-----	5	101	
Slate, black-----	5	106	
Chip slate-----	6	112	
Coal-----	5	117	
Clay, soft-----	2	119	

Well 14/10W-1A1

Type of record: Driller's log.

Altitude: About 615 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	5	5	
Gravel-----	30	35	
Sand-----	17	52	
Gravel-----	2	54	

Well 14/10W-10L1

Type of record: Driller's log.

Altitude: About 510 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface, sandy-----	7	7	
Sand-----	74	81	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, blue-----	10	91	
Slate, black-----	3.5	94.5	
Clay-----	1.5	96	
Shale, sandy-----	5	101	
Slate, dark-blue-----	11	112	
Slate, black-----	2	114	
Coal-----	4.6	118.6	
Clay, dark-----	2.4	121	
Shale, sandy-----	5	126	
Shale, blue-----	53.5	179.5	
Slate, black-----	1.5	181	
Coal-----	1.5	182.5	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/10W-10L1--Cont.			
Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Clay-----	1	183.5	
Sandstone-----	3	186.5	
Slate, sandy, blue-----	7.5	194	
Shale, sandy, light-----	14	208	
Slate, sandy, blue-----	3	211	
Slate, black-----	1	212	
Slate, sandy, blue-----	4.2	216.2	
Coal-----	3.7	219.9	
Sandstone-----	2.5	222.4	
Slate, sandy, blue-----	31.1	253.5	
Slate, black-----	6.5	260	
Coal-----	.5	260.5	
Clay-----	2	262.5	
Slate, sandy, blue-----	12.5	275	
Sandstone-----	9	284	
Slate, sandy, blue-----	6	290	
Coal-----	1	291	
Clay band-----	.4	291.4	
Coal-----	1.6	293	
Dark band-----	.2	293.2	
Coal-----	1.7	294.9	
Coal and slate-----	.4	295.3	
Clay-----	1.7	297	

Well 14/10W-12P1

Type of record: Driller's log.

Altitude: About 600 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	18	18	
Hardpan-----	17	35	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Limestone-----	15	50	
Shale, light-----	6	56	
Limestone-----	6	62	
Shale, gray-----	87	149	
Shale, dark-----	7	156	
Limestone-----	5	161	
Shale, light-----	4	165	
Shale, black-----	10	175	
Coal-----	4	179	
Fire clay-----	3	182	
Slate, gray-----	5	187	
Limestone-----	4	191	
Slate, gray-----	9	200	
Shale, dark-----	.6	206	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/10W-12P1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, gray-----	33	239	
Coal-----	2	241	
Fire clay-----	1	242	
Shale, light-----	3	245	
Sandstone-----	2	247	
Limestone-----	3	250	
Sandstone-----	3	253	
Shale, light-----	7	260	
Coal-----	3	263	
Sandstone-----	14	277	
Shale, brown-----	7	284	
Shale, dark-----	19	303	
Slate and coal-----	4	307	
Shale, light-----	2	309	
Sandstone-----	7	316	
Shale, light-----	13	329	
Shale, sandy-----	11	340	
Coal-----	6	346	
Fire clay-----	2	348	
Shale, blue-----	2	350	
Slate-----	4	354	
Fire clay-----	1	355	
Shale, light-----	17	372	
Coal and slate-----	4	376	
Shale, gray-----	12	388	
Sandstone-----	11	399	
Shale, blue-----	1	400	

Well 14/10W-33K1

Type of record: Driller's log.

Altitude: About 615 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Soil and clay-----	8	8	
Clay, yellow, and sand-----	13	21	Trace of water
Hardpan, solid, gray-----	9	30	
Hardpan, soft, gray, and sand----	5	35	Trace of water
Hardpan, solid, gray-----	15	50	

Well 14/10W-34K1

Type of record: Driller's log.

Altitude: About 580 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	4	4	
Sand-----	11	15	
Softpan, sandy-----	29	44	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

## Well 14/10W-34K1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	8	52	
Sandstone-----	10	62	
Shale, light-----	16	78	
Shale, blue-----	15	93	
Blackjack-----	1.5	94.5	
Coal-----	5.5	100	
Clay-----	8	108	
Limestone-----	4	112	
Shale, gray-----	6	118	
Sandstone-----	17	135	
Shale, sandy-----	35	170	
Shale, blue-----	41	211	
Slate, black-----	2	213	
Coal-----	1	214	
Clay-----	2	216	
Limestone-----	2	218	
Shale, gray-----	5	223	
Shale, dark-blue-----	7	230	
Slate, black-----	1	231	
Shale, blue-----	1	232	
Rock slate, black-----	1.4	233.4	
Slate, black-----	2.2	235.6	
Coal-----	4.6	240.2	
Clay-----	4.8	245	
Limestone-----	4	249	
Sandstone-----	9	258	
Shale, blue-----	28	286	
Rock slate, black-----	2	288	
Slate, black-----	2	290	
Coal-----	2.4	292.4	
Clay-----	3.6	296	
Sandstone-----	5	301	
Slate, sandy-----	23	324	
Coal-----	2.5	326.5	
Clay-----	1.5	328	
Slate, black-----	.5	328.5	
Slate, sandy, brown-----	8.5	337	
Slate, black-----	1	338	
Coal-----	2	340	
Clay-----	5	345	
Sandstone-----	10	355	
Shale, sandy, blue-----	11	366	
Slate, black-----	5	371	
Clay-----	4	375	
Slate, sandy, blue-----	2	377	
Sandstone-----	18	395	
Slate, sandy, blue-----	2.3	397.3	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/10W-34K1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Coal-----	5.2	402.5	
Clay-----	.5	403	

Well 14/10W-36F1

Type of record: Driller's log. Altitude: About 580 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Clay and gravel-----	12	12	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, black-----	2	14	
Shale, soft, light-----	6	20	
Clay shale-----	1.5	21.5	
Limestone-----	.7	22.2	
Clay shale-----	3.8	26	
Shale, soft, blue-----	9	35	
Shale, very soft, blue-----	11	46	
Shale, blue, with hard bands----	26.2	72.2	
Blackjack-----	1.4	73.6	
Coal-----	4.9	78.5	
Fire clay-----	8.3	86.8	
Limestone-----	4.7	91.5	
Shale, sandy-----	84.5	176	
Shale, blue, with hard bands----	12.1	188.1	
Shale, dark, with light streaks--	8.1	196.2	
Coal-----	1.9	198.1	
Fire clay-----	.7	198.8	
Shale, clayey-----	2.7	201.5	
Shale, sandy-----	3.5	205	
Shale, dark-----	10.5	215.5	
Slate, black-----	3.7	219.2	
Coal-----	3.6	222.8	
Sulfur-----	.1	222.9	
Coal-----	.9	223.8	
Fire clay-----	2	225.8	
Limestone-----	1.5	227.3	
Shale, sandy-----	4	231.3	
Sandstone-----	5.5	236.8	
Shale, sandy-----	5	241.8	
Shale, tough-----	9.2	251	
Shale, blue-----	30.8	281.8	
Shale, black-----	1.2	283	
Sulfur-----	.2	283.2	
Coal-----	2.2	285.4	
Fire clay-----	4.1	289.5	
Shale, sandy-----	2.5	292	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 14/10W-36F1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale with limestone bands-----	4	296	
Shale, blue-----	4.9	300.9	
Coal-----	2.1	303	
Shale, sandy-----	3.4	306.4	
Sandstone-----	1.6	308	
Sandstone, shale partings-----	21.5	329.5	
Shale, dark-----	1.2	330.7	
Coal-----	2.7	333.4	
Shale, blue-----	10.9	344.3	
Slate, black-----	5.3	349.6	
Coal-----	.9	350.5	
Fire clay-----	1.7	352.2	
Shale, sandy-----	3.8	356	
Shale, blue-----	2.4	358.4	
Shale, sandy-----	1.8	360.2	
Sandstone-----	13.1	373.3	
Shale, blue-----	1.5	374.8	
Coal-----	6	380.8	
Fire clay-----	1.2	382	

Well 15/9W-2D1

Type of record: Driller's log.

Altitude: About 595 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Clay-----	10	10	
Drift, sandy-----	15	25	
Drift, blue-gray-----	10	35	
Drift, shaly, gray-----	13	48	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, shaly, dark-----	12	60	
Fire clay-----	12	72	
Shale, gray-----	49	121	
Shale, dark-----	2	123	
Shale, gray-----	3	126	
Shale, dark-----	16	142	
Slate-----	2	144	
Slate, gray-----	9	153	
Shale, dark-----	15	168	
Shale, gray-----	8	174	
Sandstone-----	2	176	
Sandstone, shaly-----	9	185	W.B.
Shale, gray-----	31	216	
Shale, sandy-----	3	219	
Sandstone-----	9	228	
Sandstone-----	5	233	W. B.
Shale, dark-----	2	235	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/9W-2E1

Type of record: Driller's log. Altitude: About 500 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	3	3	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Sandstone-----	8	11	
Shale, blue-----	26	37	
Limestone-----	3	40	
Shale, light-----	2	42	
Shale, black-----	16	58	
Shale, light-----	2	60	

Well 15/9W-2M1

Type of record: Driller's log. Altitude: About 485 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Sand, hard-----	20	30	
Sand-----	4	34	
Hardpan-----	13	47	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	13	60	

Well 15/9W-27A1

Type of record: Driller's log. Altitude: About 515 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Sand and rocks mixed with clay---	30	30	
Gravel and sand-----	22	52	
Gravel and sand-----	8	60	W. B.
Gravel, fine-----	8	68	W. B.

Well 15/9W-29G1

Type of record: Driller's log. Altitude: About 531 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	3.5	3.5	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, blue-----	27.2	30.7	
Slate, black-----	2	32.7	
Coal-----	1.6	34.3	
Fire clay-----	.7	35	
Shale, sandy-----	10	45	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

## Well 15/9W-29G1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, brown-----	11.6	56.6	
Limestone-----	2	58.6	
Shale, blue-----	2.4	61	
Sandstone-----	7	68	
Shale, blue-----	31.7	99.7	
Slate, black-----	4.8	104.5	
Coal-----	1.1	105.6	
Fire clay-----	1.4	107	
Shale, sandy-----	1	108	
Sandstone-----	3.5	111.5	
Shale, light-----	.5	112	
Limestone-----	2	114	
Shale, blue-----	7.5	121.5	
Coal-----	2.4	123.9	
Fire clay-----	.7	124.6	
Shale, blue-----	25.4	150	
Slate, blue-----	4.1	154.1	
Slate, black-----	.8	154.9	
Coal-----	1.1	156	
Fire clay-----	1	157	
Limestone-----	1.2	158.2	
Shale, blue-----	2.8	161	
Slate, black-----	5.2	166.2	
Coal-----	1.4	167.6	
Fire clay-----	.9	168.5	
Shale, sandy-----	6.3	174.8	
Sandstone-----	3.2	178	
Shale, sandy-----	12	190	
Shale, blue-----	10.4	200.4	
Slate, black-----	1	201.4	
Shale, blue-----	10.2	211.6	

## Well 15/9W-32G1

Type of record: Driller's log.

Altitude: About 610 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	16	16	
Hardpan, light-gray-----	3	19	
Hardpan, light-brown-----	5.5	24.5	
Sand-----	1.5	26	
Hardpan, dark-brown-----	1	27	
Hardpan, light-gray-----	6	33	
Sand-----	1.5	34.5	
Hardpan, light-gray-----	3.5	38	
Hardpan, sandy-----	4	42	
Hardpan, brown-----	27	69	
Sand and gravel-----	3	72	W. B.



Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/9W-32C1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, gray-----	8	80	

Well 15/9W-32D1

Type of record: Driller's log. Altitude: About 610 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	8	8	
Pan, sandy-----	75	83	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, gray-----	5.2	88.2	
Slate, black-----	.5	88.7	
Coal-----	.5	89.2	
Clay-----	.4	89.6	
Shale, gray-----	11.4	101	
Shale, sandy, gray-----	13	114	
Sandstone-----	6	120	
Shale, gray-----	1	121	
Limestone-----	3.5	124.5	
Shale, light-gray-----	4.5	129	
Shale, sandy, gray-----	6	135	
Sandstone-----	10	145	
Shale, sandy, gray-----	22	167	
Shale, dark-gray-----	6	173	
Slate, black-----	1.6	174.6	
Coal-----	1.2	175.8	
Clay-----	2.2	178	
Shale, sandy, gray-----	8	186	
Shale, gray-----	16	202	
Sandstone-----	5	207	
Shale, sandy, gray-----	2	209	
Sandstone-----	7	216	
Shale, sandy, gray-----	2.3	218.3	
Coal-----	.2	218.5	
Sulfur-----	.2	218.7	
Coal-----	.1	218.8	
Sandstone-----	.8	219.6	
Coal-----	.4	220	
Band-----	.1	220.1	
Coal-----	.7	220.8	
Clay-----	2.1	222.9	
Shale, sandy, gray-----	1.1	224	
Shale, gray-----	5.8	229.8	
Coal-----	.4	230.2	
Clay-----	1	231.2	
Shale, gray-----	1.8	233	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/9W-32D1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, dark-gray-----	3.5	236.5	
Slate, black-----	1.5	238	

Well 15/9W-34Q1

Type of record: Driller's log.		Altitude: About 500 feet.	
Quaternary System:			
Recent and Pleistocene Series:			
Surface fill and sand-----	12	12	
Gravel, fine-----	36	48	W. B. 36 to 67.5 ft
Sand and gravel-----	10	58	
Gravel, shot-sized-----	9.5	67.5	

Well 15/10W-10K1

Type of record: Driller's log.		Altitude: About 640 feet.	
Quaternary System:			
Recent and Pleistocene Series:			
Clay, soft, yellow-----	18	18	
Hardpan, hard-----	32	50	
Sand, fine-----	10	60	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, soft, light-----	7	67	
Shale, hard, light-----	28	95	
Sandstone, light-----	55	150	W. B.

Well 15/10W-15M1

Type of record: Driller's log.		Altitude: About 620 feet.	
Quaternary System:			
Recent and Pleistocene Series:			
Soil-----	3	3	
Clay-----	32	35	
Gravel-----	15	50	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, white-----	24	74	
Lime shell-----	2	76	
Slate, white-----	4	80	
Coal-----	3	83	
Slate, white and dark-----	87	170	T. D. 1,727 ft

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/10W-21R1

Type of record: Driller's log. Altitude: About 610 feet.

Material	Thick-ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Clay, sandy-----	10	10	
Hardpan-----	10	20	Little water at 20 ft
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, gray-----	25	45	
Shale, white-----	7.5	52.5	
Sandstone-----	12.5	65	
Shale-----	25	90	Little water at 78 ft
Shale, sandy-----	3	93	
Shale-----	31	124	
Slate-----	.5	124.5	
Shale, sandy-----	2.5	127	
Sandstone-----	5	132	
Shale, sandy-----	9	141	
Coal-----	1	142	
Shale, sandy, solid-----	33	175	
Shale, blue-----	40	215	
Slate, black-----	5	220	
Shale, sandy-----	10	230	
Sandstone, white-----	14	244	
Sandstone, yellow-----	4	248	Salt water
Shale-----	2	250	

Well 15/10W-27M1

Type of record: Driller's log. Altitude: About 610 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	19	19	
Hardpan-----	29	48	
Sand and gravel-----	8	56	W. B.

Well 15/10W-27R1

Type of record: Driller's log. Altitude: About 630 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Hardpan-----	42	52	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	62	114	
Shale, blue-----	20	134	
Slate, soft, black-----	4	138	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/10W-27R1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Fire clay-----	7	145	
Limestone-----	3	148	
Shale, light-----	4	152	
Slate, soft, black-----	5	157	
Slate, hard, black-----	1.7	158.7	
Coal-----	3.1	161.8	
Fire clay-----	5.1	166.9	
Shale, sandy, light-----	45	211.9	
Shale, blue-----	28	239.9	
Slate, soft, black-----	7	246.9	
Slate, hard, black-----	4	250.9	
Fire clay-----	3	253.9	
Sandstone-----	10	263.9	
Shale, light-----	9	272.9	
Slate, light-----	7	279.9	
Coal-----	2.8	282.7	
Fire clay-----	7.2	289.9	
Sandstone-----	16	305.9	
Shale, sandy, light-----	9	314.9	
Slate, sandy, brown-----	8	322.9	
Slate, soft, black-----	6	328.9	
Slate, hard, black-----	3	331.9	
Coal-----	1.2	333.1	
Fire clay-----	2.8	335.9	
Sandstone-----	8	343.9	
Slate, sandy, dark-----	16	359.9	
Sandstone-----	9.5	369.4	
Slate, soft, gray-----	.5	369.9	
Coal-----	6.3	376.2	
Fire clay-----	.7	376.9	

Well 15/10W-35D1

Type of record: Driller's log.

Altitude: About 615 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	8	8	
Sand-----	8	16	
Hardpan, sandy-----	17.3	33.3	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, sandy-----	1.7	35	
Sandstone-----	17	52	
Shale, sandy-----	56	108	
Shale, blue-----	9	117	
Slate, black-----	1.4	118.4	
Coal-----	.6	119	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

## Well 15/10W-35D1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Fire clay-----	2.1	121	
Shale, light-----	2	123	
Limestone-----	4.3	127.3	
Shale, blue-----	8.7	136	
Slate, black-----	1	137	
Coal-----	3.7	140.7	
Fire clay-----	1.3	142	
Shale, light-----	2	144	
Sandstone-----	23	167	
Shale, sandy-----	13	180	
Shale, blue-----	38.2	218.2	
Slate, black-----	.7	218.9	
Coal-----	.3	219.2	
Fire clay-----	1	220.2	
Shale, sandy-----	3.8	224	
Shale, brown-----	22	246	
Limestone-----	2	248	
Shale, gray-----	14.8	262.8	
Slate, black-----	.8	263.6	
Slate, black, and coal-----	1.6	265.2	
Shale, brown-----	4.5	269.7	
Sandstone-----	11.3	281	
Shale, brown-----	17.5	298.5	
Shale, black-----	6.7	305.2	
Coal-----	1.3	306.5	
Fire clay-----	2	308.5	
Shale, light-----	8.5	317	
Shale, gray-----	3	320	
Shale, brown-----	12	332	
Sandstone-----	13.2	345.2	
Coal-----	.8	346	
Slate-----	.1	346.1	
Coal-----	.6	346.7	
Slate, gray-----	.3	347	
Coal-----	3.7	350.7	
Fire clay-----	1.1	351.8	
Shale, brown-----	3.5	355.3	
Coal-----	.8	356.1	
Fire clay-----	.9	357	
Shale, blue-----	2.3	359.3	
Slate, black-----	3.5	362.8	
Coal-----	1.4	364.2	
Fire clay-----	.8	365	
Limestone-----	1	366	
Shale, brown-----	2	368	
Limestone-----	1	369	
Shale, blue-----	10.3	379.3	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

## Well 15/10W-35D1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, black-----	5	384.3	
Slate, blue-----	2.7	387	
Slate and coal-----	.6	387.6	
Fire clay-----	1	388.6	
Shale, brown-----	1.4	390	
Shale, blue-----	18	408	
Slate, blue-----	5.2	413.2	
Lower? Pennsylvanian Series:			
Coal-----	2.7	415.9	
Fire clay-----	1.1	417	
Shale, light-----	8	425	
Shale, brown-----	8	433	
Shale, blue-----	12	445	
Limestone-----	1.2	446.2	
Slate, black-----	.7	446.9	
Coal and slate-----	1.2	448.1	
Slate, dark-----	.5	448.6	
Limestone-----	48	496.6	
Shale, brown-----	29	525.6	

## Well 15/10W-35H1

Type of record: Driller's log.

Altitude: About 610 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Pan, sandy-----	20.5	30.5	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, sandy, gray-----	14.8	45.3	
Sandstone-----	.6	45.9	
Shale, sandy, gray-----	14.6	60.5	
Sandstone-----	2	62.5	
Shale, gray-----	9.5	72	
Slate, black-----	1	73	
Shale, gray-----	.5	73.5	
Slate, black-----	1	74.5	
Coal-----	.8	75.3	
Clay-----	2	77.3	
Shale, gray-----	3.7	81	
Limestone-----	2.5	83.5	
Shale, gray-----	2.5	86	
Shale, dark-gray-----	4	90	
Slate, black-----	4.3	94.3	
Coal-----	.9	95.2	
Band-----	----	95.2	
Coal-----	1.6	96.8	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 15/10W-35H1--Cont.			
Material	Thick- ness (feet)	Depth (feet)	Remarks
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Clay-----	2	98.8	
Shale, gray-----	4.7	103.5	
Shale, sandy, gray-----	10	113.5	
Shale, gray-----	64.5	178	
Shale, dark-gray-----	1	179	
Slate, black-----	3.6	182.6	
Coal-----	1.2	183.8	
Clay-----	.5	184.3	
Shale, sandy, gray-----	3.7	188	
Sandstone-----	12	200	
Shale, sandy, gray-----	14.8	214.8	
Shale, dark-gray-----	.4	215.2	
Shale, sandy, gray-----	1.8	217	
Sandstone-----	3	220	
Shale, sandy, gray-----	6.5	226.5	
Shale, gray to brown-----	7.5	234	
Shale, sandy, gray-----	8.5	242.5	
Shale, gray-----	6.5	249	
Slate, black-----	4.5	253.5	
Clay-----	2	255.5	
Shale, light-gray-----	12.5	268	
Shale, sandy, light-gray-----	3.5	271.5	
Sandstone-----	2.5	274	
Shale, sandy, gray-----	5.5	279.5	
Shale, gray-----	10	289.5	
Shale, sandy, gray-----	37.5	327	
Shale, dark-gray-----	3	330	
Slate, black-----	3.7	333.7	
Shale, brown-----	.5	334.2	
Clay-----	.6	334.8	
Shale, sandy, gray-----	4.2	339	
Shale, gray-----	6.8	345.8	
Slate, black-----	3.2	349	
Shale, sandy, gray-----	3	352	
Smut-----	.5	352.5	
Clay-----	1	353.5	
Shale, sandy, gray-----	4.5	358	

## Well 16/9W-3D1

Type of record: Driller's log.

Altitude: About 630 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Clay, yellow-----	12	12	
Clay, sandy, yellow-----	5	17	
Muck, soft, blue-----	15	32	
Hardpan-----	35	67	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 16/9W-3D1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Clay, soft, blue-----	21	88	
Hardpan-----	6	94	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, soft-----	8	102	
Sandstone-----	83	185	W. B.

Well 16/9W-11N1

Type of record: Driller's log.

Altitude: About 520 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Riverwash and hillslide-----	18	18	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, soft, blue-----	8	26	
Slate, carbonaceous, black-----	10	36	
Fire clay, plastic, white-----	8	44	
Limestone streaked with clay-----	12	56	
Limestone, coarse-grained, very hard, white-----	14	70	
Shale and slate with coal streaks	9	79	
Shale, gray-----	5	84	

Well 16/9W-15N1

Type of record: Driller's log from memory.

Altitude: About 620 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Mud, sandy, soft-----	128	128	
Mud, sandy, firmer-----	7	135	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Sandstone-----	17	152	W. B.

Well 16/9W-22L1

Type of record: Driller's log.

Altitude: About 650 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Sand-----	12	22	
Hardpan-----	23	45	
Sand and gravel-----	6	51	W. B.



Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 16/9W-22P1

Type of record: Driller's log. Altitude: About 650 feet.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	15	15	
Hardpan-----	37	52	
Gravel-----	2	54	W. B.
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, black-----	4	58	
Fire clay-----	3	61	

Well 16/9W-30Q1

Type of record: Driller's log. Altitude: About 630 feet.

Old hole-----	100	100	
Quaternary System:			
Recent and Pleistocene Series:			
Muck, sandy-----	70	170	Dry
Coal-----	.5	170.5	Slight seepage
Mud-----	2	172.5	Dry
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Bluestone-----	2.5	175	Dry
Shale, gray-----	15	190	Slight seepage
Shale, dark-----	45	235	Do
Shale, gray-----	15	250	W. B.

Well 16/9W-31A1

Type of record: Driller's log. Altitude: About 630 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Clay, yellow-----	12	12	
Sand, hard-----	6	18	
Mud, soft, blue-----	4	22	
Hardpan-----	26	48	
Clay, blue-----	8	56	
Hardpan-----	7	63	
Mud, hard, blue-----	16	79	
Clay, blue-----	7	86	
Sand and gravel-----	9	95	W. B.

Well 16/9W-32P1

Type of record: Driller's log. Altitude: About 640 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Hardpan-----	11.5	21.5	

Table 5.--Selected well logs, Vermillion County, Indiana--Cont.

Well 16/9W-32P1--Cont.

Material	Thick- ness (feet)	Depth (feet)	Remarks
Quaternary System:			
Recent and Pleistocene Series:			
Gravel-----	3.5	25	W. B.
Hardpan-----	53	78	
Gravel-----	.5	78.5	Not much water
Hardpan-----	23.5	102	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Shale, light-----	1	103	

Well 16/9W-34H1

Type of record: Driller's log from memory. Altitude: About 590 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	6	6	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Clay, blue, and shale-----	111	117	
Sandstone, white-----	17	134	Salt water
Shale, soft-----	100	234	
Sandstone, yellow-----	106	340	Soda water in top 10 ft
Lower? Pennsylvanian Series:			
Shale-----	192	532	
Sandstone-----	3	535	
Shale-----	15	550	

Well 16/10W-9F1

Type of record: Driller's log. Altitude: About 625 feet.

Quaternary System:			
Recent and Pleistocene Series:			
Surface-----	10	10	
Hardpan and sand-----	50	60	
Pennsylvanian System:			
Middle Pennsylvanian Series:			
Slate, black-----	3	63	
Coal-----	2	65	
Fire clay-----	3	68	
Shale, light-----	8	76	
Shale, dark-----	2	78	
Coal-----	2	80	
Shale, dark-----	42	122	
Limestone-----	4	126	
Sandstone-----	6	132	
Shale, light-----	8	140	
Shale, blue-----	51	191	
Coal-----	1	192	