STATE OF INDIANA
INDIANA DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

BULLETIN NO. 4

GROUND-WATER RESOURCES
OF
BOONE COUNTY, INDIANA

PREPARED IN COOPERATION WITH
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

INDIANAPOLIS, INDIANA
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INDIANA DEPARTMENT OF CONSERVATION

Kenneth M. Kunkel, Director

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DIVISION OF WATER RESOURCES

Charles H. Bechert, Director

By

EDWIN A. BROWN

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GEOLOGICAL SURVEY

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GROUND-WATER RESOURCES OF BOONE COUNTY, INDIANA

By Edwin A. Brown

ABSTRACT

Boone County is in central Indiana on the drainage divide between the West Fork of White River and the Wabash River. The county is rectangular in shape, comprising 427 square miles. Lebanon, the county seat, is in the center of the county, about 27 miles northwest of Indianapolis.

The topography is mainly that of a rather level, gently undulating till plain, traversed by relatively small streams and the remnants of a moraine. A chain of low morainal knolls trends northwest diagonally across the center of the county. Kames and kame-like structures are common. The greatest local relief (about 75 feet) occurs in the southeastern part of the county where the morainal hills are cut by the tributaries of Eagle Creek, which flows southward, draining the eastern part of the county. Sugar Creek, a somewhat larger stream, flows westward and drains the northern half of the county. The headwaters of Eel River, flowing southwestward, drain the south-central and southwestern parts of the county.

According to U. S. Weather Bureau data, the normal annual precipitation at Whitestown is 38.74 inches and the humidity averages about 70 percent. The mean annual air temperature is 51.3° F. The county is principally an agricultural center with a few industries in the larger communities. Three

of the municipalities have a population greater than 1,000. Numerous small agricultural communities are common throughout the county.

A mantle of glacial drift, at least 354 feet thick according to one record, covers the entire county with the exception of a bedrock outcrop along the bed of Sugar Creek on the county line in the northwestern part of the county. The rocks cropping out beneath the drift are Paleozoic in age, ranging from the Middle Devonian limestones in the east to lower Mississippian sediments in the west. The rocks apparently dip west-southwest at a rate of about 25 feet per mile. A few wells indicate that the formations below the Devonian yield mineralized water. The best bedrock wells--which, however, do not have large yields--obtain water from the Devonian limestones and Mississippian limestones, sandstones, and other clastic sediments.

The topography of the buried bedrock surface is relatively rugged. The main bedrock drainage system follows rather closely the present course of Sugar Creek. In the areas of the Devonian rocks, the slopes of the bedrock surface are gentle. However, the contact of the Mississippian and Devonian formations is marked by a steep escarpment trending northwest through the approximate center of the county. The buried upland in the western part of the county is dissected by ravine-like valleys.

The major part of the county outside the valleys of Sugar Creek, Eagle Creek, and the headwaters of Eel River is underlain by gravelly till or "blue clay" containing interbedded deposits of sand and gravel outwash. The surficial materials in the northeastern part of the county are considered to be deposits of the Bloomington morainic system and those in the southwestern part of the Champaign morainic system.

Outwash terrace remnants are moderately extensive along the valleys of Eagle and Sugar Creeks. Many kames and kame-like deposits of sand and gravel are scattered throughout the county.

The buried sand and gravel deposits within the drift are fairly numerous, especially in the upper part, but usually are thin and not extensive over broad areas. They are believed to be connected hydraulically, however, and furnish the major part of the ground water used in the county. Thick units of fine sand, many of which contain well-preserved vegetal material and combustible gas, are fairly common. Buried swamp-type muck deposits containing vegetal remains were reported in several wells. Yellow clay is present within the drift at various levels. Such evidence suggests that some of the drift is of Illinoian age or older. The thicker deposits of sand and gravel are more common in the bedrock valleys than in the adjacent bedrock upland areas. The glacial deposits of Boone County are extremely complex.

The glacial deposits of Boone County form a large underground reservoir in which large quantities of water are stored. The reservoir is replenished by recharge from precipitation and is depleted by losses from evaporation and plant use, by natural drainage of ground water into streams, and by pumping from wells.

Throughout most of the county, ground water occurs under artesian conditions--that is, it is confined under artesian pressure. Flowing wells occur in several areas mainly along the valleys of the present streams. The piezometric surface, in general, is similar to the surface topography, and ground water discharges naturally into Sugar and Eagle Creeks.

Records of water levels in observation wells show that water levels in Boone County have a seasonal fluctuation of about 8 to 10 feet, generally being highest in April or May and lowest in November or December. In the vicinities of the larger communities where ground water is used for municipal and industrial purposes, the water levels in many wells are affected to a large extent by pumping from the municipal and industrial wells.

Water levels doubtless have declined throughout the county to a certain

extent, but the decline during the past 10 years, except where affected by pumping, has been negligible. The general trends in ground-water levels are similar to trends in precipitation throughout most of the county.

Ground water is used principally for domestic, stock-watering, public supply, industrial, railroad, air-conditioning, and other purposes. The water is obtained chiefly from drilled and from dug wells. The communities of Lebanon, Zionsville, Thorntown, and Jamestown have municipally owned and operated waterworks, and Advance is constructing one at present.

In general, the ground water is generally satisfactory from a sanitary standpoint, but it is high in mineral content. The high iron content and hardness are the chief objections for present usage. According to the chemical analyses of waters from public supplies, the average iron content is about 1.2 parts per million, the average alkalinity about 360 to 370 parts as calcium carbonate, the average total hardness about 300 to 450 parts, and the average hydrogen-ion concentration, or pH value, about 7.5. The mean temperature of the ground water measured in water from 21 wells and 3 springs during 1947 was about 52.5° F.

The present pumpage of ground water in Boone County is estimated to be about 500 million gallons a year, of which about 200 million gallons a year is used in the Lebanon area. It is also estimated that nearly 200 million gallons of water a year is wasted by the uncontrolled discharge of flowing wells throughout the county.

The municipal water supply of Lebanon is taken from wells tapping three zones of glacial sand and gravel aquifers at depths of about 50, 100, and 220 feet. The shallow zone is apparently relatively poor as a source of water, as shown by the operational difficulties in maintaining adequate yields from wells in this zone. The intermediate zone is the main source of supply at the present time. Coefficients of transmissibility and storage in this zone

were determined by pumping tests to be 10,000 gallons per day per foot and 5.7×10^{-4}, respectively. Differences in specific capacities and well loss in the four wells tapping the intermediate zone suggest that there may be a highly permeable lens of sand and gravel in the southwest part of the well filled that is not present in the northeastern part. It appears likely that additional water might be obtained from the deeper zone from widely spaced wells.

The future potentialities of ground-water supplies in Boone County appear to be fairly promising, particularly for small supplies. The complexity of the glacial deposits make the correlation of individual aquifers difficult and often impossible, and considerable test drilling may be required to locate sand and gravel deposits of sufficient thickness and areal extent to provide adequate water supplies. Care should be taken in developing new supplies, in rehabilitating and maintaining existing wells and well fields, and in conserving ground water for beneficial use. Wells should be spaced as far apart as possible to avoid excessive interference between wells.

The sand and gravel terrace deposits along the valleys of Sugar and Eagle Creeks appear to be potentially the most productive sources of ground water in the county. Next in importance are the buried lenses of sand and gravel, many of which are described in the report. In the development of new sources of supply, the importance of test drilling and test pumping cannot be overemphasized. Information on nearby existing wells should be utilized where possible.

The waste of water from flowing wells should be reduced to prevent the lowering of ground-water levels and the depletion of ground-water supplies.

Tables of well records and chemical analyses of water from the several public water-supply systems, and maps showing the surface topography, locations of wells, topography of the bedrock surface, data on the aquifers and the piezometric surface, are included in the report.

GROUND-WATER RESOURCES OF BOONE COUNTY, INDIANA

INTRODUCTION

STATE-WIDE COOPERATIVE PROGRAM

A cooperative investigation of the ground-water resources of Indiana by the Indiana Department of Conservation and the Geological Survey, United States Department of the Interior, has been in progress since 1935. The Department of Conservation was represented prior to 1943 by the Division of Geology, from 1943 to 1945 by the Division of Engineering, and since that time by the Division of Water Resources. Detailed investigations of the ground-water resources of individual areas, generally counties, are being made as a part of the larger State-wide project. The present report is the second areal report to be prepared since the detailed county investigations were started in 1943, the first being a report on the South Bend area, St. Joseph County. 1/ The areas of Indiana on which reports have been released, the area described in this report, and the areas under investigation are shown in figure 1.

The present investigation was made under the general supervision of C. H. Bechert, Director, Division of Water Resources, Indiana Department of Conservation, and O. E. Meinzer and A. N. Sayre, successive chiefs of the Division of Ground Water, U. S. Geological Survey.

PURPOSE AND SCOPE

The importance of ground water as a natural resource has increased considerably in recent years in both rural and urban areas. The increased

1/ Klaer, F. H., Jr., and Stallman, R. W., Ground-water resources of St. Joseph County, Indiana; Part 1, South Bend area: Indiana Dept. Cons., Div. Water Resources Bull. 3, 1948.

availability of electricity and the demand for better sanitary facilities on farms and the increasing demand for water by municipalities and industries in towns and cities have resulted in a greater demand for dependable ground-water supplies. The City of Lebanon, the county seat of Boone County, has had difficulty for several years in maintaining an adequate supply of water from wells during periods of peak demand. In response to a request from the officials of the Lebanon Utilities, Inc., a municipally owned and operated corporation, a preliminary investigation of the ground-water resources of the Lebanon area was made in May 1945 by F. H. Klaer, Jr., of the U. S. Geological Survey, as a part of the State-wide investigation. The results of this work, released in typewritten form, included a summary of the available information on ground-water supply in the Lebanon area and pointed out the need for a detailed study of the ground-water resources of the entire county in order to obtain the basic information needed for the proper and economic maintenance of the existing ground-water supply. The county investigation, the results of which are presented in this report, was started in December 1945 in cooperation with the City of Lebanon.

The investigation as proposed included the detailed study of the surface and subsurface geology of the entire county to determine the thickness, areal extent, and outcrop areas of water-bearing and non-water-bearing formations, and their relations to potential sources of recharge; the relation of changes in ground-water levels to precipitation, pumping, and other factors; the seasonal and long-term trends in ground-water levels; the running of pumping tests to determine the hydraulic characteristics of the water-bearing formations; and a study of chemical analyses of ground water to determine the quality of water in each water-bearing zone and the changes in quality over a period of time.

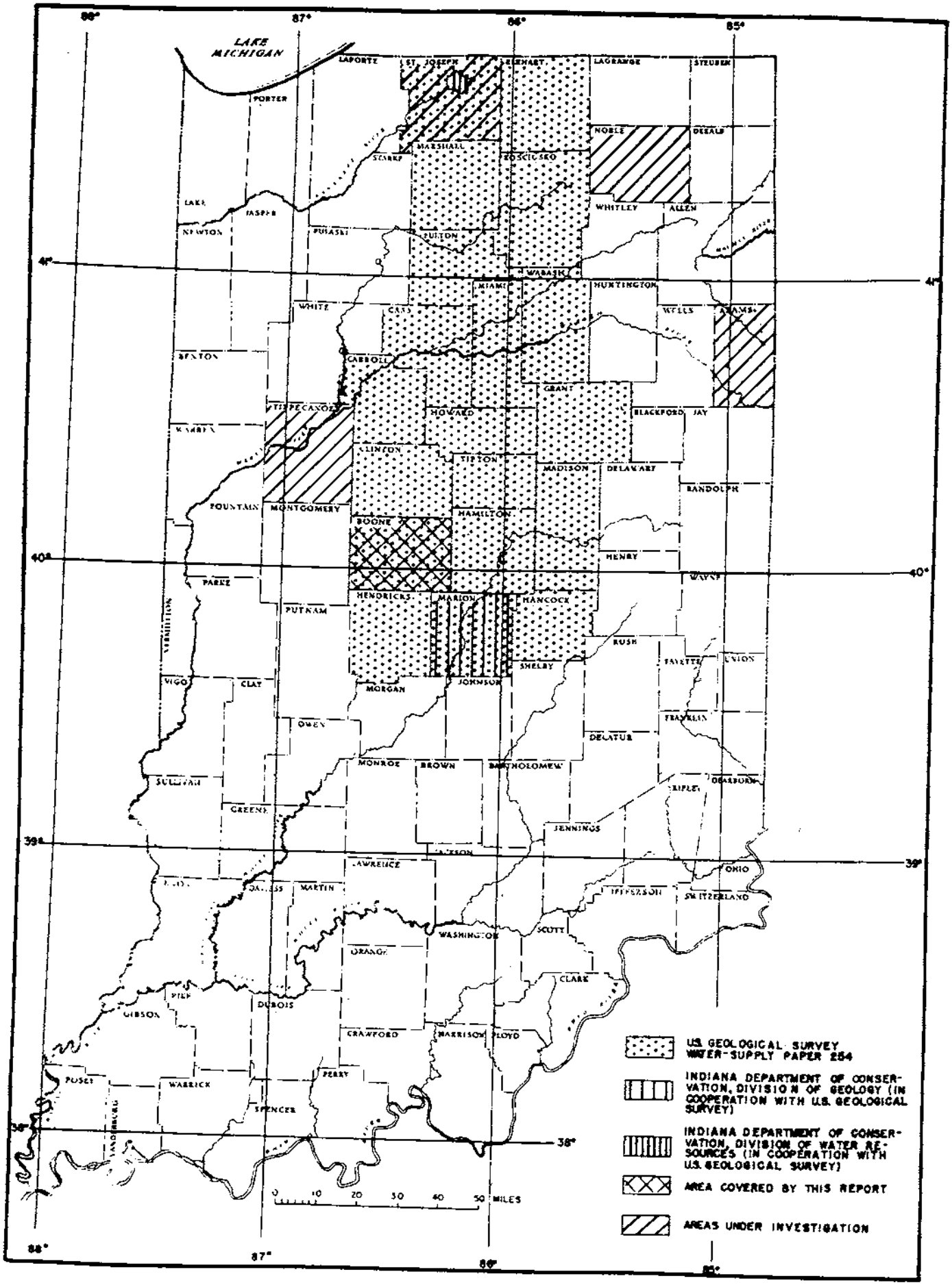

FIGURE 1. MAP OF INDIANA SHOWING LOCATION OF AREAS ON WHICH REPORTS HAVE BEEN PUBLISHED, AREA DESCRIBED IN THIS REPORT, AND AREAS UNDER INVESTIGATION

SUMMARY OF FIELD WORK

A preliminary investigation of the available information on the geology and ground water resources of the Lebanon area was made by F. H. Klaer, Jr., in May 1945. During 1945 several observation wells were established and regular measurements of water levels in these wells were started on October 26, 1945, and have been continued to date, by Fred Price of the Lebanon Utilities, Inc. Two observation wells had been established near Lebanon in the fall of 1935 as a part of the State-wide observation well program, but measurements of water levels had been discontinued in October 1941. Measurements of water levels in these wells were resumed in 1945.

Information on other wells was obtained by B. W. Swartz and the writer during January 1946. The well inventory was resumed in January 1947 by the writer and was continued through July 1947. The surficial deposits and glacial geology of the county were studied and mapped by W. D. Thornbury, of Indiana University, and the writer in August 1946. Pumping tests were made in the municipal well field at Lebanon in February 1947 by R. W. Stallman, assisted by B. W. Swartz, H. L. Ballard, and D. T. King. Surface elevations at wells on which information had been obtained were determined by the writer in July and August 1947, using a Paulin altimeter and bench marks established by the U. S. Coast and Geodetic Survey.

ACKNOWLEDGMENTS

The author wishes to acknowledge the helpful assistance given by the officials and other members of cities, towns, and industries, in providing information on existing wells and water supplies. Special thanks are due the many well drillers, particularly those listed on pages 10 and 11 of this report, who provided much of the information included in the tables of well records in appendix A.

The employees of the Lebanon Utilities, Inc., T. J. Burrin, Manager,

Fred Price, and others, have helped greatly in providing information, making water-level measurements, and assisting on pumping tests in the Lebanon area.

The aerial photographs provided by the State Highway Commission of Indiana have been used to great advantage in studying the topography and drainage of Boone County. Chemical analyses in appendix C were made by the Indiana State Board of Health. Data on pumpage from the public water-supply systems of the several cities and towns of Boone County were provided by the Public Service Commission of Indiana.

Thanks are due F. H. Klaer, Jr., under whose supervision the investigation was made, for his guidance and criticism throughout the project, and R. W. Stallman for his suggestions and criticism of the report.

PREVIOUS WORK

Information on the geology, geography, and ground-water resources of Boone County is given in several published reports. One of the earliest publications is that by Gorby and Lee (7),[2/] which includes a general discussion of the geography and geology and contains detailed logs of many wells. Leverett (10) presents a brief description of the geography of the county and detailed discussions and logs of many wells, including some of those published by Gorby and Lee. Capp's report (4) gives a more detailed account of the ground-water geology and resources of the county, containing records of wells, water levels, and chemical analyses of ground waters. Leverett and Taylor (11) discuss in considerable detail the glacial geology of the county in relation to the surrounding region and include many logs of wells, mostly those from former reports. Harrell's publication (8) is a general summary of the ground-water geology and resources of the county based mainly on information in previous reports. Tharp and Quinn (17) give a brief discussion of the topography, drainage, and agriculture of the county and a

[2/] See references in bibliography, appendix D.

detailed discussion of the soils. Much of the information in this report on the geology and glacial history has been taken from these publications.

WELL RECORDS

Much information on the geology and ground-water resources of a given area can be obtained by a study of existing wells and the records obtained during the drilling of wells and tese holes. In Boone County, information on wells and well drilling was obtained from well owners, residents, and well drillers. The records thus obtained are summarized and tabulated in appendix A. The locations of the individual wells are shown on plate 2.

The records of wells in appendix A have been provided in large part by the following well drillers, who gave freely of their time and information to help in the present study:

John Bomaine	Clayton
Flem Boyd	Lebanon
Willard English	Clayton
R. A. Holt and Sons	Darlington
A. R. Kelly	Frankfort
Claude Kersey	Lebanon
Clyde Kersey	Lebanon
James Kersey	Lebanon
Noble Niger	Colfax
Charles Krauss & Sons	Indianapolis
Harold Lister	Clarks Hill
Ray Lister	Thorntown
Kamp Lomax	Sheridan
Earl Merritt	New Augusta
Thomas Walton	Zionsville

It should be realized that many of the well data included in appendix A were obtained mainly from conversation and not from written records. Information obtained from different persons regarding the same well was sometimes different, and it was not possible to check much of the information obtained. Many of the wells in Boone County are sealed at the top or otherwise constructed in such a way as to prevent the measurement of the total depth or of the water level. The author has attempted to present the best data available where questions exist, and where serious disagreement has been found the uncertainty is indicated by a question mark.

In order to facilitate the identification of a particular well, each well is assigned a number. In the numbering system adopted for use in Indiana, the well number has a geographic significance that enables its location to be determined within a 1-square-mile section.

Boone County contains all or parts of 16 townships of land as it is divided in the township and range system of the General Land Office. Each of these townships is designated by a capital letter, starting with A and lettering alphabetically from the westernmost boundary in the northern tier and proceeding eastward, then dropping one tier south, following the same plan of lettering alphabetically eastward. (See plan in lower right corner of pl. 2.)

The well number includes the prefix "Bo" to designate Boone County. To this is added the capital letter indicating the township in which the well is located, and to this group of letters is added the number of the section of the township within which the well is located. This tripartite symbol of the well number indicates the geographic location of the well.

To this symbol is added a number which identifies the individual well of well owner. It is separated from the former symbol by a dash. If one owner has several wells within the same section, additional identifying

numbers are given to each of these wells. These numbers are added to the geographic symbols and owner's number following a dash. Test wells are designated by the letter T before the last number in the well-numbered symbol. Gas or oil wells are designated by the letter G and a dash which appears in front of the county prefix. Observation wells are noted by the letter O and a dash which appear before the county prefix. Those parts of the geographic tripartite symbol for which the information is not known are replaced by question marks. Examples of well numbers are BoAlh-1, BoF36-1-10, and G-Bo ??-1.

Some of those wells for which only a general location is known are listed first in appendix A. They are given an identification in numerical order as the information was recorded. A few records of wells in surrounding counties are included in this report. The county prefix for these wells is shown on plate 2, and at the end of the tables in appendix A.

GENERAL DESCRIPTION OF THE AREA

LOCATION AND SIZE

Boone County is in central Indiana. Lebanon, the county seat and the largest city, is at the geographic center of the county (see pl. 1), about 27 miles northwest of Indianapolis. The intersection of longitude 86°30' and latitude 40°00' is about 2½ miles south and 1½ miles west of the county courthouse in Lebanon, through the center of which the second principal meridian of Indiana runs. The county is rectangular in shape, being about 24 miles in an east-west direction and about 17½ miles in a north-south direction, and comprises about 427 square miles. Its population according to the U. S. Census was 22,081 in 1940, and 22,290 in 1930.

TOPOGRAPHY AND DRAINAGE

The area under discussion lies within the Tipton Till Plain physiographic division of central Indiana. The land surface ranges in elevation from about 774 feet above mean sea level, along Sugar Creek at the Montgomery County line, to about 976 feet on knolls 2½ miles east-southeast of Lebanon in sec. 3, T. 18 N., R. 1 E., and about 5 miles south-southwest of Lebanon in sec. 34, T. 18 N., R. 1 W., as determined by altimeter traverses. The contours of the land surface shown on plate 1 were based on the bench marks established by the U. S. Coast and Geodetic Survey, 110 of which are located along the major highways in the county.

The land is an almost flat to gently rolling plain on the broad divide between the drainage basins of the Wabash River and the West Fork of White River. The slopes throughout most of the county are very gentle and the local relief is generally less than 30 feet within an area of several square miles. A belt of morainal knolls runs diagonally across the county from the

northwest to the southeast corner, having somewhat greater local relief along its margins.

The natural drainage on the uplands throughout most of the county is generally very poor. According to Gorby and Lee (7, p. 162) there were originally many depressions in which water accumulated to form swamps and bogs of considerable depth. The greater number of these areas are now drained by open ditches and tile. During periods of heavy rainfall, however, many fields are flooded for several weeks because of slow drainage through the tile drains.

Near the streams the slopes are more pronounced, especially along Eagle Creek, which flows south in the eastern part of the county. In the area of its headwaters between Whitestown and Zionsville, where morainal hills are common, the topography is the most rugged in the county. Eagle Creek and its tributaries are youthful streams with V-shaped valleys. The gradient of Eagle Creek is estimated to be about 9 feet per mile, and the local relief between the stream and the uplands may be as much as 75 feet.

Sugar Creek, flowing west across the northern part of the county, and its tributaries drain the major part of the county. It is somewhat more mature than Eagle Creek, its gradient being estimated as about 5 feet per mile. It has a relatively broad valley with rather gentle slopes, the local relief between the flood plain and the valley walls being about 50 feet.

Little Sugar Creek and Walnut Fork are minor drainage lines in the western part of the county. They flow west, joining Sugar Creek in Montgomery County. Big Racoon Creek, draining the southwestern part of the county, flows southwest to join the Wabash River near Montezuma.

A major part of southwestern and south-central Boone County is drained by the headwaters of Eel River. The three main tributaries, North Fork of Walnut Creek, Edlin Ditch, and Grassey Branch, have low gradients estimated

as 2.4, 2.9, and 2.7 feet per mile, respectively. They are small, shallow streams, following the original drainage lines in a broad, shallow basin or depression with an outlet near Jamestown.

Within this area are some mounds or knolls that have elevations similar to those on the drainage divide between Sugar and Eagle Creeks. They are in alinement with this divide, the axis of which would form a gently curved arc across the entire county from northeast to southwest, bending toward the southeast.

CLIMATE

The U. S. Weather Bureau has maintained a station in southeastern Boone County since March 1896. It was first located in Northfield but was transferred 4 miles southwest to Whitestown in November 1908. The climatological data given in this report are taken from the records (18) of this station.

The climate of Boone County is typical of that of the interior Midwestern States; i.e., rather cold winters, hot summers, a relatively high humidity, and considerable precipitation. The mean annual air temperature is 51.3° F. The temperature has ranged from a maximum of 105° F. to a minimum of -14° F. in the last 10 years. The growing season between killing frosts has averaged 162 days in this period. The prevailing winds are from the southwest. The humidity in this general region averaged about 70 percent for the period 1944-46, according to records of the U. S. Weather Bureau station at the Indianapolis municipal airport.

Table 1. Annual precipitation, in inches, at Northfield, 1896-1907, and Whitestown, (1908-47), Indiana. (U. S. Weather Bureau data.)

YEAR	PRECIPITATION	YEAR	PRECIPITATION	YEAR	PRECIPITATION
1896[1/]	35.09[2/]	1914	30.31	1932	40.73
1897	38.30	1915	45.90	1933	33.13

Table 1. (Con't.).

YEAR	PRECIPITATION	YEAR	PRECIPITATION	YEAR	PRECIPITATION
1898	47.54	1916	37.45	1934	27.34
1899	32.90	1917	40.90	1935	36.69
1900	36.08	1918	42.34	1936	32.34
1901	30.34	1919	37.88	1937	43.52
1902	33.25	1920	35.47	1938	44.07
1903	37.12	1921	42.93	1939	36.12
1904	37.60	1922	44.13	1940	27.37
1905	40.15	1923	46.44	1941	29.32
1906	38.94	1924	39.81	1942	38.75
1907	37.49	1925	36.76	1943	34.13
1908[c/]	28.99	1926	50.25	1944	31.47
1909	50.31	1927	47.89	1945	48.61
1910	26.55+[b/]	1928	41.49	1946	39.88
1911	38.13	1929	49.93	1947	36.98
1912	37.75	1930	33.42		
1913	44.52	1931	36.12		

a/ Northfield.

b/ Incomplete record.

c/ Whitestown.

According to the U. S. Weather Bureau, the normal annual precipitation at Whitestown is 38.74 inches. The total annual precipitation at Northfield (1896-1907), and Whitestown (1908-47), is given in table 1 and is shown in figure 2.

The four years of greatest rainfall were 1909, 1926, 1929, and 1945; and the four years of least rainfall were 1934, 1940, 1908, and 1941, in

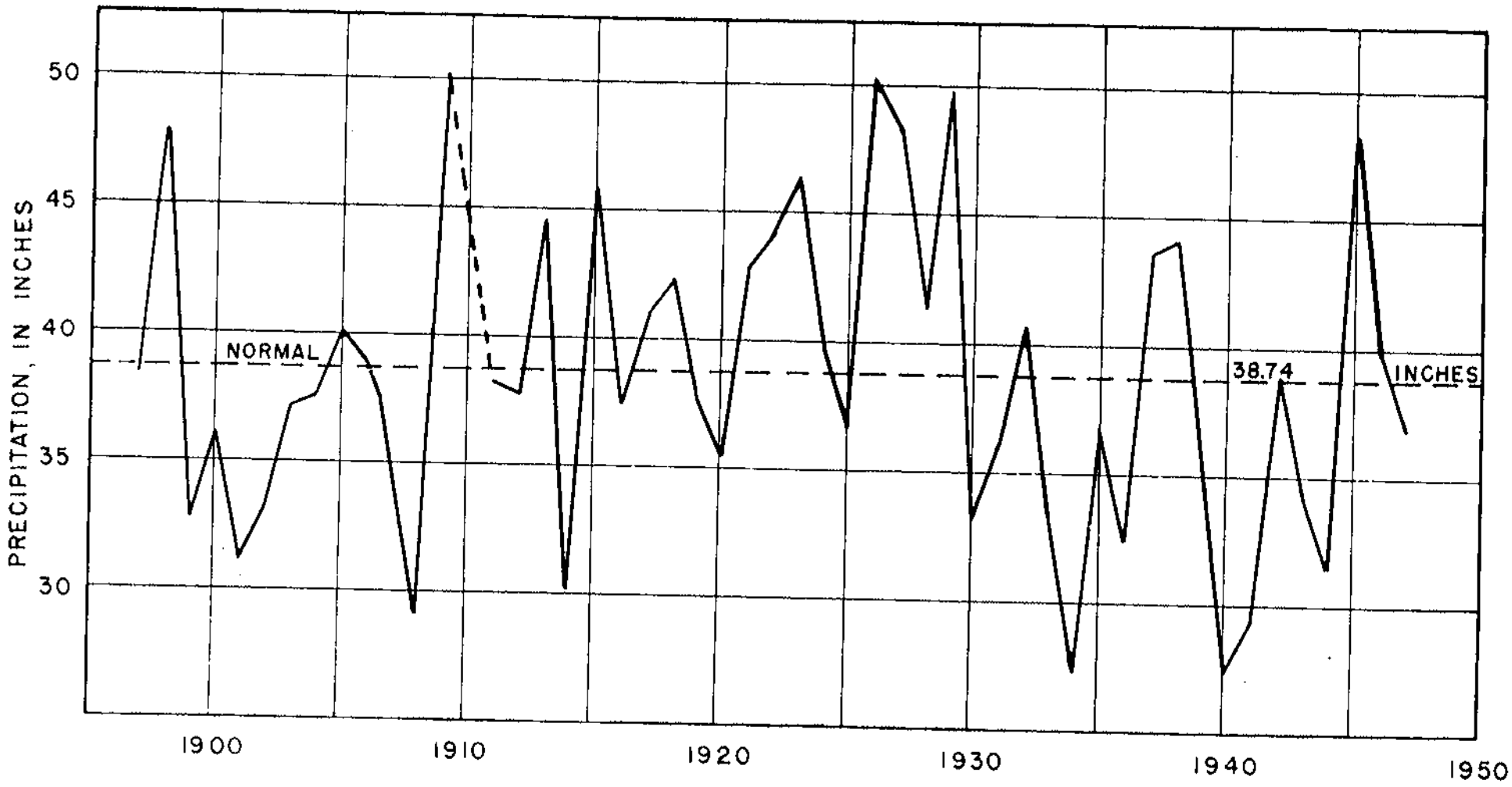

FIGURE 2. ANNUAL PRECIPITATION AT NORTHFIELD (1897-1907) AND AT WHITESTOWN (1908-47), BOONE COUNTY, INDIANA. (U. S. Weather Bureau data)

order from highest to lowest. Since 1930 there have been five years during which precipitation was 6 inches or more below normal and only one year during which precipitation was 6 inches or more above normal.

The normal monthly and seasonal precipitation at Whitestown is shown in table 2.

Table 2. Normal precipitation, in inches, at Whitestown, Ind., by months and seasons. (U. S. Weather Bureau.)

Winter		Spring		Summer		Autumn	
Dec.	2.65	Mar.	4.09	June	3.63	Sept.	3.46
Jan.	2.98	Apr.	3.57	July	3.55	Oct.	2.79
Feb.	1.99	May	4.05	Aug.	3.28	Nov.	2.70
	7.62		11.71		10.46		8.95

March or May usually is the wettest month and February usually is the driest. The heaviest precipitation of the year generally occurs during the spring, when conditions for ground-water recharge are favorable because evapo-transpiration losses are low and temperatures are usually sufficiently high to permit thawing of frozen ground.

GENERAL GEOGRAPHY

The city of Lebanon is situated on an upland flat, near the center of the main drainage divide of the county, on the upper reaches of Prairie Creek. It had a population of 6,529 in 1940, and 6,445 in 1930, according to U. S. Census data. The figure is doubtless somewhat larger now, owing to the migration of population to the towns and cities during the war years. Lebanon is an expanding industrial and agricultural center. Industries include stoker and other heating-equipment production, bus-body fabrication, assorted iron and steel products, canning, a milk plant, and other smaller varied industries. It is on main lines of the New York Central and Pennsyl-

vania Railroads and is a terminus of the Central Indiana Railroad. Three major highways pass through the town. (See pl. 1 and fig. 3.)

Zionsville, which had a population of 1,314 in 1940, and 1,131 in 1930, is mainly a residential and agricultural community. It is in the southeastern corner of the county on the upland of the west bank of Eagle Creek. Several large oil and gas tank farms, pumping stations, and an oil refinery are located in Marion County about 2 miles south of the town, and a large bio-chemical plant is just south of the town.

Thorntown, which had a population of 1,226 in 1940, and 1,325 in 1930, is an agricultural town with minor industries. It is on the south bank and uplands of Sugar Creek at its junction with Prairie Creek, in the northwestern part of the county.

Jamestown is a small agricultural and industrial community on the county line in the southwestern section of the county, on the northwest bank of Eel River. It had a population of 583 in 1930. A pumping station of an oil and gas company is located just southeast of the town in Hendricks County.

Advance, population 365 in 1940, is a small agricultural community 5 miles north of Jamestown.

Numerous smaller communities are rather evenly distributed over the county.

ROCKS AND THEIR RELATION TO THE OCCURRENCE OF GROUND WATER

The occurrence of ground water is controlled largely by the geologic and hydrologic characteristics and relationships of the various rocks and soils of the earth's crust. The rocks of Boone County may be divided into two general groups: the consolidated Paleozoic sediments, or bedrock formations, and the unconsolidated Pleistocene glacial deposits. Ground-water conditions in the two groups are quite different.

The bedrock is buried under a mantle of glacial drift over practically the entire county. The only outcrop of bedrock known to the writer is in the bed of Sugar Creek in the northwestern part of the county. The outcrop serves as the foundation for the bridge on the Montgomery-Boone County line road, a quarter of a mile north of State Highway 47. The greatest thickness of glacial drift on record is 354 feet, in well BoK17-1 (pl. 2). In this well limestone was struck at that depth. Other wells that penetrated great thicknesses of glacial drift are: BoK5-4-2, 350 feet; G-Bo??-2, 342 feet; BoB35-1, 320 feet; BoC5-1, 314 feet; and G-Bo??-3, 285 feet.

The majority of wells in Boone County derive their water supply from sand and gravel in the glacial drift; detailed records of wells penetrating bedrock are relatively scarce. Most of the information on the bedrock was obtained from wells in the western part of the county, where the elevation of the bedrock is greater and the glacial deposits are thinner.

BEDROCK GEOLOGY

Rock Units and Their Water-Bearing Properties

The general succession of rock formations underlying Boone County and their water-bearing properties are shown in table 3. As the majority of wells in Boone County obtain their water supplies from the glacial drift or

Table 3. Generalized section of the geologic formations of Boone County a/

System	Series	Stratigraphic Unit	Character of Material	Ground-Water Conditions
Quaternary	Recent	Alluvium	Clay, silt, sand, and gravel in bottom of larger streams	Moderate supplies available from sands and gravels. Deposits are fine-grained and less permeable than the glacial outwash deposits. Limited in Boone County to valleys of main streams.
	Pleistocene	Wisconsin glacial drift	Till (boulder clay), sand and gravel	Moderate to abundant supplies from outwash deposits of sand and gravel; moderate supplies from lenses of sand and gravel interbedded with till. Small supplies from dug wells in till.
		Illinoian glacial drift	Till (boulder clay), sand and gravel	Moderate to abundant supplies from outwash deposits of sand and gravel; moderate supplies from lenses of sand and gravel interbedded with till.
		Older glacial drift?b/	Red clay above bedrock, in southeastern part of county	Unimportant as a source of ground water. Generally necessary to drill into underlying bedrock formations to get adequate supplies.
Mississippian c/	Lower Mississippian c/	Borden group Edwardsville formation Floyds Knob formation Carwood formation Locust Point formation New Providence shale	Shale, siltstone, and sandstone Limestone Sandstone and siltstone Shaly siltstone, and shale Shale and sandstone	Small supplies from limestone or sandstone layers.
		Rockford limestone	Limestone	Unimportant as a source of water.
Devonian	Upper Devonian	New Albany shale	Black and brown shale	Meager supplies only. May supply a few domestic wells in Boone County. Water likely to be rather highly mineralized.
	Middle Devonian	Jeffersonville (?) ("Corniferous") d/ limestone	White to gray limestone much creviced and channeled in some places	Moderate to abundant supplies from crevices. Supplies meager where limestone is dense, with few crevices.
Silurian		Niagara limestone	Blue to buff limestone, massive to crystalline, creviced in places	Moderate to abundant supplies from crevices. Supplies meager where limestones are dense, with few crevices.
Ordovician	Upper Ordovician	Cincinnatian series	Shales, with a few thin interbedded limestones	Unimportant as a source of ground water.
	Middle Ordovician	Trenton limestone d/	Massive limestones, in places dolomitic	Yields salt water; also gas and oil in relatively small quantities in some places.
	Lower Ordovician	St. Peter sandstone	Porous sandstone	Small supplies of highly mineralized water.

Table 3. Generalized section of the geologic formations of Boone County a/ (continued)

a/ Based on section by C. L. McGuinness in "Ground-water resources of the Indianapolis area, Marion County, Indiana": Ind. Dept. Conservation, Div. of Geology, pp.16-19, (mimeographed) Jan. 1, 1943, modified by the writer.

b. May be residual soil or deposit of pre-Pleistocene age.

c. The Mississippian is regarded by the U. S. Geological Survey as a series of the Carboniferous system and by the Indiana Division of Geology as a separate system.

d. Geologic names in common use by drillers.

from the upper bedrock formations, detailed information on the deeper bedrock formations is incomplete.

The regional dip of the bedrock formations is west-southwest and the younger formations are present only in the western part of the county. These are the shales and siltstones (perhaps the Carwood formation) of the Borden group of Mississippian age, which are underlain by the Rockford limestone, also of Mississippian age, and the New Albany shale of Devonian age. Underlying the New Albany shale in the central and western parts of the county and immediately underlying the glacial drift in the eastern part of the county are the limestones of Devonian age. The locations of wells that penetrated bedrock and the type of bedrock penetrated are shown in plate 3. The logs of wells penetrating bedrock are included in appendix B.

Silurian and Ordovician Rocks

Several wells in Boone County that penetrate the Silurian and Ordovician formations are G-Bo??-1 at Lebanon, G-Bo??-4 at Thorntown, G-Bo??-7 at Zionsville, BoF36-1-11 at Lebanon, and G-BoH34-2 near Rosston. The well near Rosston is the deepest known in the county (1,825 feet), penetrating the St. Peter sandstone of Ordovician age. The well was reported to yield mineralized water from the St. Peter sandstone at a depth of 1,600 feet and salt water (10 gallons per hour) from the Trenton "lime" between depths of 1,048 and 1,142 feet. A 47-foot stratum of limestone (probably of Niagaran age) at a depth of 515 feet was also reported to be water bearing (app. B). In well BoF36-1-11 at Lebanon, the limestone (probably of Niagaran age) 407 feet thick did not yield sufficient water for municipal supply, although in other parts of the state the limestones of Niagaran age generally yield moderate supplies of water to wells. Conditions do not appear favorable for obtaining moderate to large supplies of potable water from the Silurian and Ordovician formations in Boone County.

Devonian Rocks

Limestones

The limestones of Devonian age are the uppermost bedrock formations in the eastern part of the county, east of a line running northwest from the southeast corner of the county through Zionsville, between Whitestown and Gadsden, and near Pike. The wells in which the Devonian limestones were found at the bedrock surface are included in table 4, with the elevations of the top of the limestones and the thicknesses penetrated.

Table 4

Wells in Boone County penetrating Devonian limestones

Well	Type of rock	Thickness (feet)	Elevation of top, in feet above mean sea level	Position
BoB35-1	Probably limestone	?	590	At bedrock surface
BoG5-1	Limestone	?	623	do.
BoL14-2	Blue Limestone	17	720	do.
BoL27-1-1	Limestone	10	676	do.
HaE31-1	do.	19	707	do.
G-Bo??-4	"Corniferous" limestone (4, p. 74; 6, p. 263; 12, p.45)	37	460	Below New Albany shale
G-Bo??-7	"Devonian limestone with sandstone at base" (12, p. 44)	75	625	do.
BoH31-2-1	Hard white limestone	93	656	Below shale
G-BoH34-2	Limestone; water	67	713	do.
BoL7-1	Limestone	65+	693	do.

The mention of sandstone at the "base of the Devonian limestone" in the log of well G-Bo??-7 is the only known record in Boone County of what may be the Pendleton sandstone or its correlative. The limestone is known to be water bearing in the wells given above, except in wells G-Bo??-4 and G-Bo??-7, for which no information is available. The yields of the wells

are generally ample for domestic and farm use. The water from well BoL14-2 was reported to be slightly mineralized and that from well HaE31-1 was reported to be somewhat "oily."

New Albany shale

Many wells in the eastern and southeastern parts of the county have penetrated a black shale, the New Albany shale of Upper Devonian age, which overlies the middle Devonian limestones. Its complete thickness in the eastern half of the county is not known, the greatest thickness penetrated being 90 feet in well BoH31-2-2 where it is the uppermost bedrock formation at an elevation of 751 feet above sea level.

Wells in which the complete thickness of the New Albany shale was drilled are G-Bo??-4, at Thorntown, in which 87 feet of "Hamilton shale" (New Albany) was reported, and BoF36-1-11, in Lebanon, in which 75 feet of black shale was logged. It is probable that much of the 204 feet of blue and black shales in well G-Bo??-1 and possibly all the shale in well G-Bo??-2, both in Lebanon, is the New Albany. Shale was reported as the uppermost bedrock in well BoK5-4-2 at an elevation of 570 feet above sea level. This is probably the New Albany shale, as the top of the New Albany was reported at an elevation of 607 feet above sea level in well BoK4-1-2, about a mile northeast. If so, this is the westernmost point known where the New Albany shale forms the bedrock surface. The New Albany shale generally does not yield water to wells in sufficient quantities to be considered as a source of water supply.

Mississippian Rocks

Rockford limestone

The Rockford limestone, which marks the base of the Mississippian, is a relatively thin (generally less than 20 feet thick) but rather persistent

limestone. It was found in Lebanon in well BoF36-1-11, at an elevation of 601 feet above sea level, where 7 feet of limestone is overlain by 100 feet of blue shale and is underlain by 75 feet of black shale. About 3 miles south of Lebanon, in well BoK17-1, 7 feet of non-water-bearing limestone, which is probably the Rockford, was found at an elevation of about 600 feet above sea level.

In the eastern part of the county, a limestone aquifer was found at an elevation of about 760 feet above sea level in wells BoH14-1, BoH16-1, and BoH20-1. The elevation of the limestone in relation to that of the New Albany shale in nearby wells indicates that the limestone lies above the black shale and, therefore, is probably the Rockford. The limestone was 18 feet thick in well BoH14-1 and 12 feet thick in well BoH20-1. The Rockford limestone generally does not yield large quantities of water to wells.

Borden group

The majority of the wells in the southwestern half of the county that penetrate bedrock end in rocks of the Borden group of Mississippian age. Rocks of this group have been described by drillers as "soapstone," "blue shale," "green shale," "limestone," "sandstone," "porous rock," and "hard white rock." The Borden group in its outcrop area in southern Indiana has been described in detail by Stockdale (15). It is pointed out that there is considerable variation in lithology both vertically and laterally, and major changes in the type and character of the formations are common. Stockdale (pl. 2, column 3), has separated the Borden group in southern Indiana into the following formations:

Formation	Lithologic character	Average thickness (in feet)
Edwardsville formation	Mainly sandstone, shale, and siltstone, with local limestone reef deposits	50-55

Formation	Lithologic character	Average thickness (in feet)
Floyds Knob formation	Limestone and shale	2-6
Carwood formation	Sandstones, siltstone, and shale, with local limestone reef deposits	115-120
Locust Point formation	Siltstone, sandstone, shale	120-130
New Providence shale	Kenwood beds - sandstone and shale. ("soapstone) Argillaceous shale (soapstone with local limestone reef deposits)	200

He also reports (15, p. 62), that the Borden group becomes thicker from south to north and from east to west. The maximum thickness of the Borden group in Boone County is not known. A well at Thorntown (G-Bo??-4) showed 238 feet of "Subcarboniferous limestone and shale" (6, p. 23; 4, p. 74; 12, p. 45).

A study of well logs and of the elevations at which the Mississippian-Devonian contact was encountered indicate that the base of the Borden group dips southwestward at a rate of from about 15 to 40 feet per mile, the average dip being about 25 feet, or less, per mile.

New Providence shale. - According to Stockdale (15), although the New Providence shale, like the other formations of the Borden group, may vary widely in character, it is usually an argillaceous shale, commonly known by many well drillers as "soapstone." The blue shale or "soapstone" generally is not water bearing. The logs of several wells in the central and western parts of the county showed the presence of sandstones and "yellow limestones" about 230 feet above the base of the Mississippian strata. The "yellow limestone" may be an iron-stained calcareous sandstone. These strata are believed to be in the upper part of the New Providence shale or perhaps at the base of the Locust Point formation.

The eastern limit of the formations of the Borden group, including the basal New Providence shale, runs roughly parallel to and 1 to 2 miles east of U. S. Highway 52, as indicated by the logs in about 25 wells. This coincides fairly well with the line of the buried "Knobstone" escarpment as shown in plate 3.

In general the New Providence shales yield little or no water to wells, although the sandstone and "yellow limestones" in the upper part may yield sufficient water for domestic and stock use.

Locust Point formation. - In southern Indiana the Locust Point formation is composed mainly of alternating sandstones, siltstones, and shales with interbedded calcareous lenses. In Boone County many of the bedrock strata between 230 and 370 feet above the base of the Borden group are reported to be limestone. It is possible that the "limestones" in reality may be calcareous sandstone, or the Locust Point formation may be largely calcareous in Boone County. Most of the so-called "limestone" aquifers that produce sufficient water for domestic and stock use are in this interval, as shown by wells BoJ8-1 (12 feet of white limestone), BoJ15-2-1 (15 feet of limestone), and BoL36-1 (18 feet of limestone).

Carwood, Floyds Knob, and Edwardsville formations. - The remainder of the bedrock formations of the Borden group in Boone County fall in the interval between 370 and 470 feet above the base of the group. The upper 100-foot interval may represent the Carwood formation and may perhaps include part of the Floyds Knob and Edwardsville formations.

In southern Indiana the Carwood is mainly a sandstone with minor shale and siltstone lenses. The only sandstone reported in this interval is that found in well HaA16-1-1, in Hamilton County in which its thickness is not

recorded. The elevation of the sandstone is about 390 feet above the base of the Borden group. In Boone County several "limestone" aquifers that supply sufficient water for domestic and stock use occur in this interval, such as those found in wells BoI18-1-3 (5 feet of yellow porous rock), BoI29-1 (70 feet of hard white limestone), and BoM15-1-3 (17 feet of white porous limestone).

As described above, much of the bedrock is listed as blue shale. This type of rock does not seem to be diagnostic as the term is used to describe the bedrock at many elevations and in many different areas. It does suggest, however, that the rock is in the Borden group. Most of the drillers report that water is obtained from crevices in this type of rock and from nonporous limestones and sandstones. The crevices are reported to decrease in abundance with depth, so that if water is not obtained in the upper part of the rock the chances of success decrease accordingly. The logs of certain wells, such as BoM10-6-5 (412 feet of soft blue shale), G-Bo??-4 (238 feet of "Subcarboniferous" limestone and shale), and BoM9-2-1 (123 feet of soft blue shale), probably are not sufficiently accurate or detailed for correlative purposes.

The only outcrop of bedrock in Boone County known to the writer, the location of which is described on page 19, is a light- to medium-drab to greenish-gray fine-grained siltstone containing a minor percentage of mica flakes and sand grains. It appears to be slightly porous and contains a small percentage of small pyrite inclusions. Small impressions about 10 millimeters in length and 2 millimeters in width, with parallel lines along the long axis, are believed to be plant remains. Irregular, hairlike impressions suggest worm trails.

Fragments of the relatively "fresh" unoxidized rock do not react to cold or warm hydrochloric acid. The surface of the rocks of the outcrop is

buff to dark brown to black, oxidized, leached, somewhat porous, and iron-stained. The rocks have a blocky appearance and a hackly fracture. Certain parts of the outcrop are reported by a local well driller to contain "Indian beads," the description of which suggests crinoid columnals.

This outcrop occurs probably about 345 feet above the base of the Borden group. Its stratigraphic location is in the upper part of the Locust Point formation, but it is possible that the rocks are basal beds of the Carwood formation. The reported abundance of crinoid columnals and the topographic location seem to favor the latter hypothesis. The Carwood formation is the resistant rock that caps the Knobstone escarpment in many places in southern Indiana. However, the Locust Point formation is also found at the crests of some hills in the outcrop area in southern Indiana.

TOPOGRAPHY OF THE BEDROCK SURFACE

The topography of the bedrock erosion surface in Boone County as shown in plate 3 is considerably rougher than the topography of the present surface. Because of the unequal distribution of wells drilled to bedrock, the detail of mapping throughout the county is variable. The accuracy of the map is dependent on that of the available well records, and as additional information is obtained revision of the map will doubtless be necessary.

The wells in which bedrock has the highest elevations are BoJ26-4 (limestone at an elevation of 914 feet) and BoJ26-5 (limestone at 907 feet), in Milledgeville, and BoI22-1 (shale at 899 feet), in Advance; and the wells with lowest bedrock elevations are BoB35-1 (bedrock at 590 feet), near Pike, and BoK5-4-2 (shale at 590 feet) and BoK17-1 (limestone at approximately 600 feet), just southeast of Lebanon. The relief based on the measured elevation of bedrock in individual wells is, therefore, about 324 feet, but according to the contour map the relief within the county may be as much as 400 feet.

The contours of elevation show an escarpment paralleling the trace of the Mississippian-Devonian contact described above. A similar escarpment occurs in the outcrop area of the Borden group in southern Indiana, because of differential erosion of the more resistant rocks of the Borden group and the less resistant New Albany shale.

It is noted that east of this buried escarpment the bedrock slopes are rather gentle and uniform, averaging about 70 to 80 feet per mile, but that west of it the topography appears as a rather well defined plateau with relatively flat uplands and almost precipitous ravines. The highest elevation east of the escarpment is on a bedrock mound in secs. 9, 10, 15, and 16, T. 19 N., R. 2 E. Well HaE30-1, east of this area in Hamilton County, entered limestone at an elevation of 800 feet. West of the escarpment the plateau averages about 800 to 890 feet in elevation, with the exceptions in Milledgeville and Advance previously mentioned. The elevation of the bedrock upland declines to about 800 feet near Thorntown. Two mounds that reach elevations of 820 to 830 feet occur 2 miles north of Lebanon and midway between Royalton and Zionsville, respectively. These are probably outliers of Mississippian rocks.

The former drainage pattern of the bedrock erosion surface agrees generally with the regional subsurface drainage of central Indiana. The main tributary to the main trunk stream headed south through the center of T. 19 N., R. 1 E. It drained practically the entire eastern half and the extreme southern part of the county. The dashed line extending northeast from Lebanon on plate 3 indicates the possibility that the bedrock drainage entering Lebanon from the south might have drained along this line instead of turning northwest, as shown.

GLACIAL GEOLOGY

Glacial History

Following withdrawal of the shallow continental seas in which the sediments were deposited during the Paleozoic era, the land surface was subjected to weathering and erosion. The rock strata became consolidated and were gently folded, and erosion and weathering removed a large quantity of rock material. The surface topography, as shown by plate 3, was quite similar to parts of southern Indiana today.

During the Pleistocene epoch of geologic time, climatic changes caused the accumulation of large masses of snow and ice in the northern part of North America. As the accumulation continued, the ice masses expanded horizontally, with the greatest expansion to the south. The large masses of ice and snow, called continental glaciers, advanced at a faster rate in troughs or depressions than on the upland. The ice fronts became irregular as the rate and direction of movement of the ice front varied because of changes in climatic conditions. The glacial history and the conditions under which the glacial materials of Boone County were deposited were rather complex.

The major glacial stages, during which the ice sheets covered much of the North Central States, were separated by interglacial stages during which the materials were subject to modification by weathering and erosion. Climatic conditions during the interglacial stages may have been somewhat similar to those of the present time, as shown by the presence of swamp deposits, buried trees, and other plants within the mass of glacial deposits.

According to published reports on the glacial geology of the Midwestern States, Indiana was covered by at least two large continental ice sheets. Minor advances and retreats of the ice front were common during the major stages.

Although the deposits of the Illinoian stage are the oldest glacial deposits in Indiana for which identification has been definitely established, an earlier glacial stage may be represented. In many localities in Indiana a bed of red clay and gravel that lies immediately above the bedrock may represent the Kansan or Nebraskan stage. The deposits of the earlier glacial stage have been recognized in several states west of Indiana.

The Illinoian ice sheet covered nearly three-quarters of the State, being absent only in a triangle-shaped area in south-central Indiana. Where the Illinoian deposits are exposed at the surface their thickness is generally less than 50 feet. They may be considerably thicker, however, in central and northern Indiana.

The last ice sheet to cover central Indiana was that of the Wisconsin stage. From west to east the southern boundary of Wisconsin glaciation extends through Vigo, Parke, Putnam, Morgan, Bartholomew, Decatur, Fayette, and Franklin Counties. As the Wisconsin drift and underlying Illinoian drift are quite similar in appearance and general character, it is difficult and sometimes impossible to determine the contact between the deposits of the two glacial stages. The maximum known thickness of combined Illinoian and Wisconsin drift in Indiana is more than 500 feet and the average thickness is at least 300 feet in several counties in northern Indiana.

Subsurface Glacial Deposits

The information on the subsurface glacial materials of Boone County must be obtained from records of wells, most of which are based on the memory of the well driller or owner. Actual drilling samples were seen in only a few places and it was not possible to obtain a complete set of samples for any well. It should be remembered that these deposits were laid down under

a complex set of natural conditions and the materials may change radically within short distances both horizontally and vertically. Several gravel-pit operators claim that they have removed sand and gravel up to a nearly vertical wall of blue clay. Wells within several feet of each other are reported to have penetrated entirely different materials at similar depths. Specific examples of such differences were found in wells BoG31-4-1 and BoG31-4-2; and in BoK18-3-1 and BoK18-3-2, where one well struck a sand and gravel aquifer and the other, blue clay at the same depth.

The major part of the glacial material underlying the surface of Boone County is described by drillers as "tough blue clay" with assorted stones and boulders. This is typical boulder clay of glacial till. Interbedded with the till deposits are beds and lenses of sand and gravel that serve as underground reservoirs in which ground water is stored and from which water supplies can be obtained through wells. The sand and gravel deposits where water bearing are called aquifers. Normally sand and gravel aquifers occur at many different levels within the till deposits, but, because of their irregular areal extent, in several locations in the county wells have been drilled to bedrock without encountering an aquifer. Such failures were reported not only in the western part of the county where the drift is relatively thin but also in the eastern part when the drift cover is considerably thicker. In many cases, however, productive wells were obtained within short distances of the unsuccessful wells.

Most of the wells do not penetrate the full thickness of the aquifer tapped. The general practice for farm and domestic wells is to drill into the water-bearing formation only so far as is necessary to obtain the desired yield.

The elevation of the tops of glacial aquifers penetrated by wells in Boone County are shown on plate 4 and figures 3 and 4. These elevations are

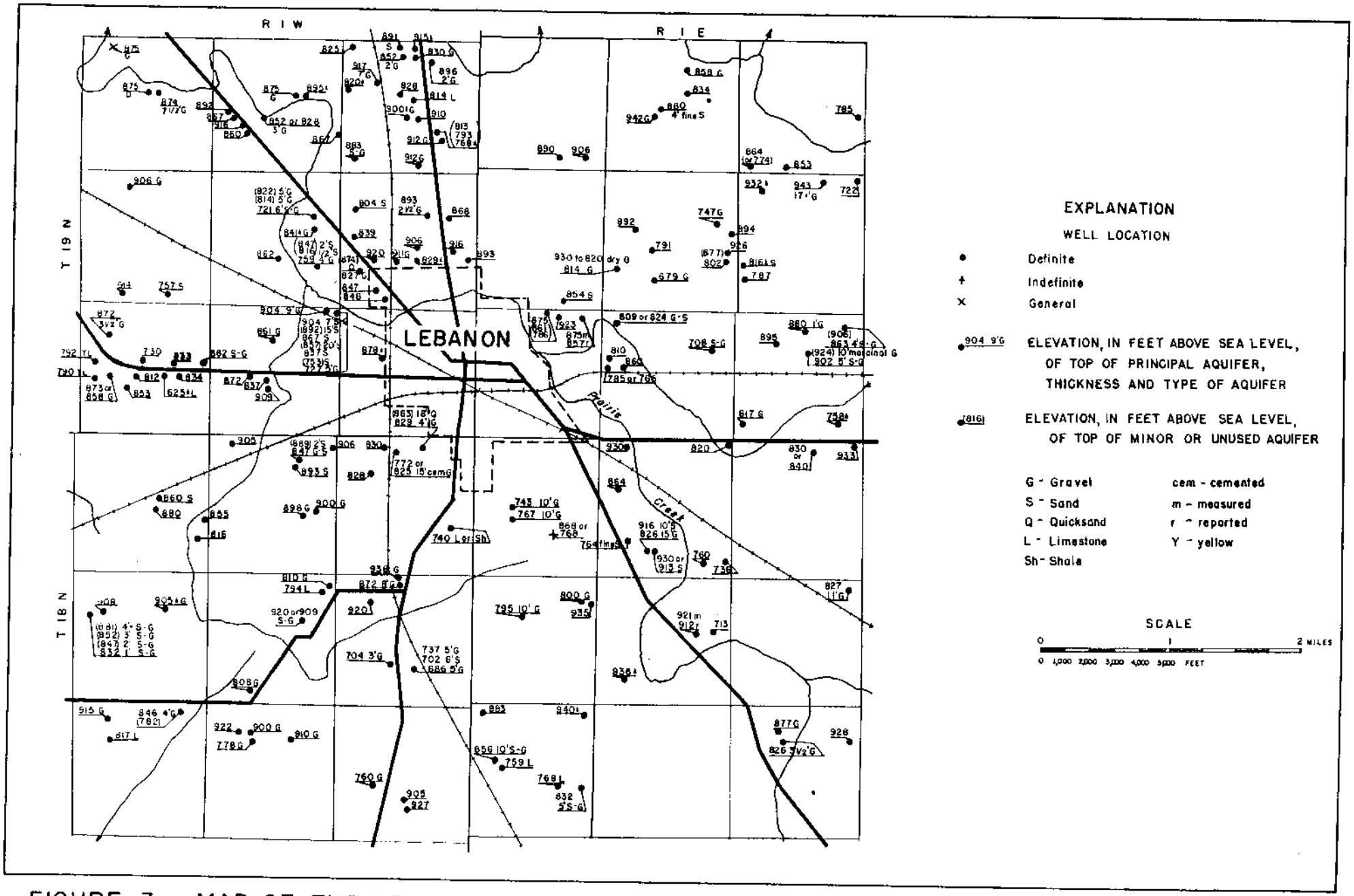

FIGURE 3. MAP OF THE LEBANON AREA, BOONE COUNTY, INDIANA, SHOWING DATA ON AQUIFERS.

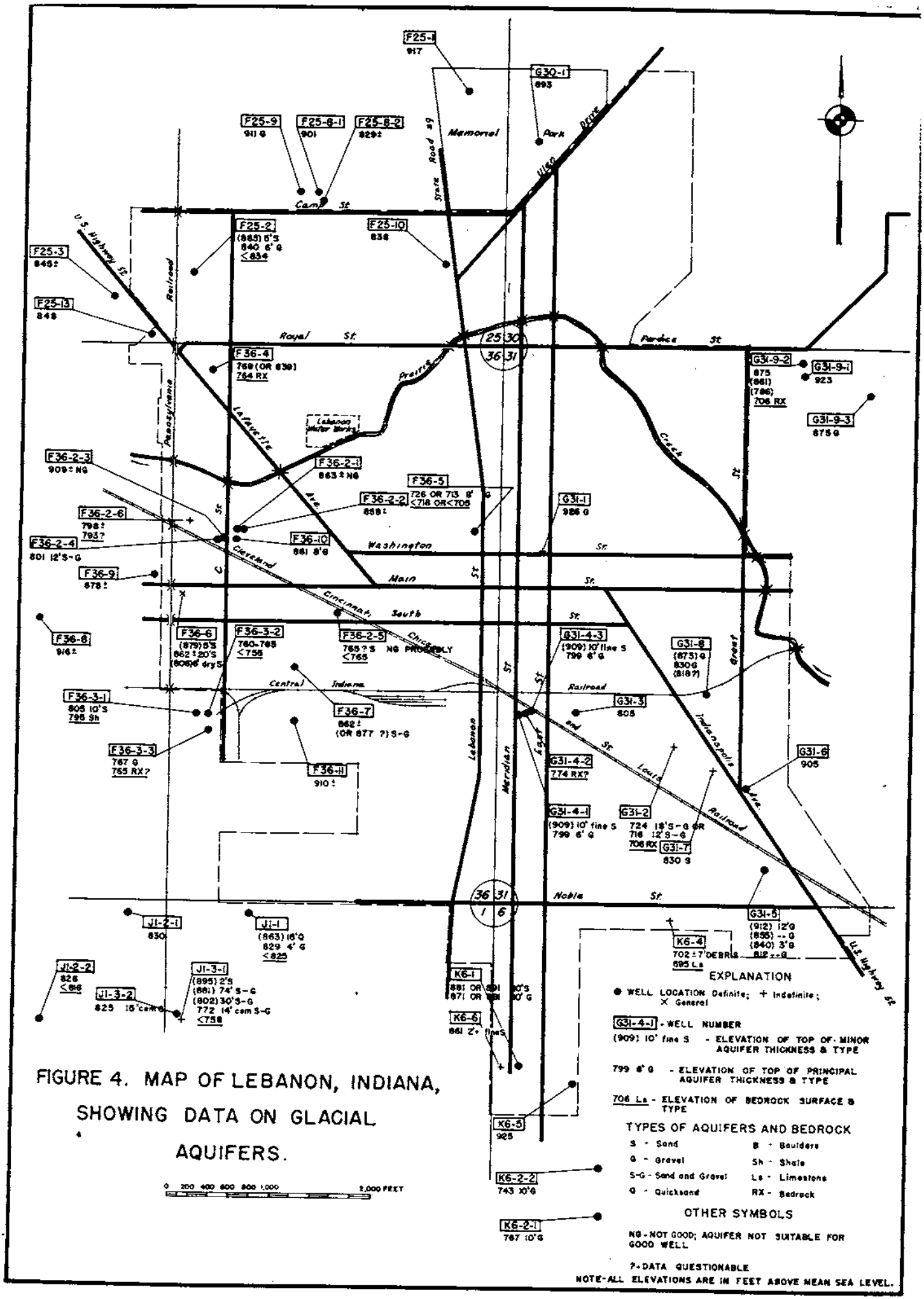

FIGURE 4. MAP OF LEBANON, INDIANA, SHOWING DATA ON GLACIAL AQUIFERS.

in feet above sea level, and in many cases are estimated on the basis of the depths of wells. The thickness in feet and/or type of aquifer are noted after the elevation for those wells in which this information is known. More detailed data are included in the well records. A study of the maps and well records reveals that the elevations of the tops of aquifers in many wells in the county are identical or nearly so, and that in certain areas some aquifers are evidently more common than others. This evidence, plus the fact that there appear to be relatively impermeable beds of considerable thickness between the aquifers, suggests that many of the aquifers were probably deposited over many parts of the county on a relatively level surface. The aquifers in certain wells may have been formed by the irregular deposition of outwash or may be the remnants of sand and gravel deposits partially removed by later erosion.

According to the well records, certain aquifers are rather extensive throughout the county outside the present stream valleys. The tops of these aquifers are found at elevations of 930, 903 to 908, 874, (860), 830 to 840, 808±, (765-775), and 740 to 750 feet above sea level. Those shown in parentheses are of relatively local importance.

The elevations above sea level of the tops of important aquifers in different parts of specific areas are given below:

Lebanon area	Sugar Creek drainage area	Eagle Creek drainage area	Southwest part of county	Extreme northeast part of county
905 to 920	874	928	925 to 930	930
(892)	860	903 to 908	910	874
875	830 to 834	868	906	750 ±
860	820	840	896 to 900	
820 to 838	808	820	884 to 890	

Lebanon area	Sugar Creek drainage area	Eagle Creek drainage area	Southwest part of county	Extreme northeast part of county
805	796	798 to 808	878 to 880	
765	785	775	870	
	773	760	832 to 838	
	734 to 740	750	810 to 814	
	724	740	784 to 788	
	701 to 706	730	740	
	662 to 666		704	

A spring in the NE¼SE¼ sec. 22, T. 19 N., R. 1 W., occurs at an elevation of about 920 feet; springs and seeps in sec. 19 and 20, T. 20 N., R. 1 E., near the center of the NE¼ sec. 26, in the N½ sec. 25, and in the SE¼SE¼ sec. 23, T. 18 N., R. 2 E., are at elevations of about 860 to 870 feet; and a spring numbered as well BoL25-2 is at an elevation of 837 feet. A number of springs in the vicinity of Big Springs occur at elevations of 915 to 935 feet.

Wells in the Lebanon area reported to have penetrated aquifers 8 feet or more are listed below:

Well No.	Owner	Elevation of top of aquifer	Thickness in feet, and type of aquifer
BoF36-1-11	Lebanon Utilities, Inc.	709	8±, Sand and gravel
BoF36-1-10A	do.	714±	12, Gravel and quicksand
BoG31-2	Industrial Land Co. of Indianapolis	724 (or 716)	18 (or 12), Sand and gravel
BoK6-2-2	Joseph Tyre	743	10, Gravel
BoK6-2-1	do.	767	10, Gravel
BoJ1-3	Pennsylvania R.R.	772	14, Cemented gravel
BoK7-2	O. E. Heflin	795	10, Gravel

Well No.	Owner	Elevation of top of aquifer	Thickness in feet, and type of aquifer
BoJ1-3	Pennsylvania R.R.	(802)	30, Sand, gravel, and boulders
BoF36-1-3	Lebanon Utilities, Inc.	833	10 or 40, Sand and gravel
BoF36-1-7	do.	842	19±, Sand and gravel
BoF36-1-8	do.	858 (or 843)	35±, Sand and gravel
BoK18-3-1	Seth Agan	856	10, Gravel and sand
BoF36-6	Pennsylvania R.R.	862±	20, Sand
BoJ1-1	Joseph LaBolle	(863)	18, Quicksand
BoK6-1	Ed Piercol	871 (or 881)	10, Gravel overlain by 10 feet of sand
BoF36-1-2	Lebanon Utilities, Inc.	886	12, Sand and gravel
BoF35-1-7	Dan Presser	904	9, Gray gravel
BoG31-5	Indiana Condensed Milk Company	(912)	12, Gravel

It is notable that the majority of wells in the Lebanon area that are reported to penetrate thick aquifers are in the southern part of Lebanon and south of it (fig. 3).

Cemented gravel was report in wells BoJ1-3 and BoF?-37 and was observed in outcrops in sec. 23, T. 18 N., R. 2 E.

Lenses of "fine sand" which may be water bearing in part are reported in many localities in the glacial drift. The greatest concentration of these sands, ranging in thickness from a few inches to as much as 70 feet (in wells BoJ22-1 and BoK30-2), is along the former drainage lines of the bedrock surface. Beds of quicksand are reported in many wells near Sugar Creek.

Other glacial materials of interest occur within the till in Boone County. Although many of these materials have little direct significance to the ground-water supplies of the area, they do assist in the interpretation of the glacial geology and, therefore, are discussed in this report.

Gas, and vegetal material ranging in size from leaves and twigs to branches and tree trunks greater than a foot in diameter (in well BoB19-2), have been found in the glacial till of Boone County. The gas is reported to be combustible in most cases, suggesting its source to be the buried vegetal material undergoing decay. Most of the wells in which gas has been reported either yield small quantities over a rather long period, or else yield strong flows for several minutes or hours and then practically cease giving off the gas. However, well BoF26-2-2, northwest of Lebanon, supplied enough gas for cooking purposes for one family for about a year before the pressure became too low. The gas may have come from a 6-foot interval of sand and gravel at a depth of 216 feet, although it did not gush forth until 8 feet of the underlying blue shale bedrock was penetrated. Fine sand forming a cone about 150 feet in diameter and 3 feet high at the apex was blown out of the well by the gas pressure in a period of about 24 hours. Gas in well BoL7-1 is believed by the owner to come from the limestone aquifer tapped at a depth of about 245 feet, under approximately 45 feet of shale.

The elevations of the top of the deposits in which vegetal matter was discovered are 676, 689, 704, 730 to 737, 750 to 753, 760 to 764, 778, 814 to 822, and 891 to 903 feet above sea level. The elevations at which gas was found are 700, 720 to 740, 760, 820±, 850, 890, and 903 feet. The source of the vegetal materials doubtless is vegetation that grew locally during interglacial stages or substages and was later buried by glacial deposition.

Leverett believed that some of the formations drilled belonged to the Illinoian or older drifts. (See notes regarding wells G-Bo??-2, at Lebanon, and G-Bo??-8, at Zionsville, in app. B.)

The term "hardpan" is used by drillers to describe several types of deposits. It is evident that some use this term to designate the usual bluish-gray boulder clay, some to designate a firm, uniform bluish-gray clay through

which it is hard to drill, and some to designate a yellow to reddish-brown compact clay. There seems to be no consistent usage of this term.

A study of the locations of wells in which unusual thicknesses of sand and buried vegetal matter are found shows that these deposits are confined largely to areas that are underlain by the deeper V-shaped bedrock valleys. It is notable that deposits ranging from 3 to 12 feet in thickness, containing dark swamp-type muck in which leaves, twigs, and branches of trees are embedded, occur at depths of 46 to 61 feet below the surface in areas that aline closely with the position and direction of a glacial sluiceway mentioned by Leverett (11, p. 96). These deposits are penetrated by wells BoH?-12, BoI?-16, and Bo?-22 at an elevation of about 895 feet above sea level. Although well BoH?-12 lies northeast of the sluiceway in the morainal area, and the muck is buried beneath the morainal deposits, the well is in line with the sluiceway. These beds probably were deposited during a minor retreat of the ice front during the Wisconsin stage.

A large elongated area along the headwaters of Eel River, heading into the morainal hills trending northwest across the county from the vicinity of Zionsville, has been mapped by Leverett (11, pl. 5), as a glacial sluiceway for the meltwaters from the ice front that formed the moraine (pl. 1). He noted that the present streams are now filling the channel, an indication that the streams were probably larger than at present. The channel appears to be quite shallow, as records of wells fail to show any thick or extensive deposits of outwash materials in this area. The greatest thickness of outwash noted is 70 feet of sand, the top of which is at an elevation of 931 feet, in well BoJ33-2. Many wells throughout Boone County were reported to penetrate a layer of sand and gravel, 2 to 10 feet thick, at elevations of about 900 to 930 feet above sea level. A comparison of plates 1 and 3 shows that the headwaters of Eel River largely overlie deep ravines in the bedrock

surface, except near Jamestown where the present stream crosses the buried uplands of the bedrock.

Yellow clay is common in the drift. It is commonly present at the top of the blue clay, but it also occurs at scattered horizons in the blue clay. Sections at an outcrop in the south side of Eagle Creek in the center of the W½W½ sec. 1, T. 17 N., R. 2 E., and in gravel pits in the SE¼SW¼ sec. 10, T. 18 N., R. 1 W., and in the W½W½NE¼ sec. 12, T. 17 N., R. 2 W., show a leached and oxidized subsoil zone below a bluish-gray calcareous clay. A 2- to 2½-foot zone of gumbotil is present above the subsoil zone in the section mentioned second above. These occurrences may be the remnants of a soil zone of the Illinoian or an older drift.

If the drainage area of the headwaters of Eel River is the site of a glacial sluiceway, as proposed by Leverett, it would have been of only local importance because of its topographic position along the divide between the White River and Wabash River drainage areas. Subsurface evidence agrees with this, as described above. A possible explanation of this basinlike area is that the moraine that was deposited diagonally across the county blocked the drainage of the area of the headwaters of Eel River and the drainage of the southeastern portion of the county from Zionsville and Northfield through the area just north of Whitestown, as shown on the bedrock map (pl. 3), causing reversal of flow and resulting in the present drainage pattern, in which the headwaters of Eel River flow southwest and Eagle Creek flows south. The morainal deposits are assumed to have filled in and built up the area of the main valley tributary to ancestral Sugar Creek, and the mouths of most of its tributaries, so that it became topographically high. (Compare pls. 1 and 3.) The position of the Sugar Creek-Eagle Creek drainage divide and the highs at Milledgeville and north of Jamestown on the present surface, occurring as a gently curved arc, might be explained by this hypothesis, or by

the theory that this area is underlain by morainal deposits of an earlier age, possibly Illinoian or earlier, or by a combination of both of these.

Surficial Glacial Deposits

The most extensive glacial deposit in Boone County is boulder clay or glacial till, commonly referred to by well drillers and natives as "blue clay." This material is primarily a blue or gray clay containing varying percentages of angular rock fragments, sand, gravel, and silt. It is derived from materials picked up by the advancing ice sheets, ground in part into a rock "flour," and dropped in place without sorting or stratification when the ice sheet became overloaded or when it melted. The till is compact and relatively impermeable and generally yields only small quantities of water to wells.

The surficial deposits of Boone County are mainly glacial till, which forms a generally level to gently rolling plain known as a till plain or ground moraine. The low mounds of the same general type of material, which occur as a discontinuous belt running northwest from the southeastern part of the county, were formed when the ice front remained at approximately the same position for a considerable time. They indicate the location of a moraine.

The stratified coarse materials found along the major drainage lines in Boone County are alluvial deposits laid down by meltwaters which issued from the glacier front when it remained stationary or retreated. They constitute outwash or a "valley train." In areas where sands and gravels were deposited by meltwaters on an almost flat surface, the deposit is called on outwash plain. The fine materials were carried away by the water.

The numerous small deposits of stratified sand and gravel scattered over Boone County were probably deposited by streams within or at the base

of the glacier. They are known as kames. Many of them are mounds that rise above the general land surface and others occur below the surface at the general plain level. Most gravel pits in the county are in these deposits.

The trend of kames and associated deposits throughout the county is in a northeast-southwest direction, similar to the present trend of Eel River. The relatively uniform trend suggests that the ice sheet moved southwest across the county, which accords with the direction of movement suggested by the deposits in nearby counties.

The relatively great permeability of the surficial materials in areas of Fox and Genessee soils, as shown on plate 1, allows water from precipitation and, in places, from stream flow to percolate freely into the underlying outwash deposits, from which the water is discharged into streams or by evaporation and transpiration (use by vegetation), or is transmitted by slow seepage to less permeable adjacent deposits. The kames and associated gravel deposits serve in a similar manner.

Recharge from precipitation doubtless occurs through the soil and glacial till in the area of ground moraine. Surface drainage is poor and large flat areas or depressions slow up surface runoff and promote ground-water recharge. However, owing to the low permeability of the till, the rate of recharge is much less than that in areas of glacial outwash.

GROUND WATER AND GROUND-WATER LEVELS

GENERAL DISCUSSION

Water falling as precipitation on the earth's surface follows a complex hydrologic cycle. Part of the precipitation returns to the air by evaporation and transpiration; part runs off into surface streams, ditches, and lakes; and part seeps into the ground. That part that is stored in the ground, generally temporarily, is called ground water.

The water that seeps into the ground tends to percolate downward through openings in the soil and rocks, including interstices between individual fragments of rock and cracks and fissures in hard rocks, to reach the zone of saturation, in which the rock openings are filled with water. The upper surface of the zone of saturation, except where formed by an impermeable body, is the water table, and its position is shown in a general way by the water levels in wells.

In areas where porous and permeable formations are present at the surface and water from precipitation can reach the zone of saturation by direct downward percolation, water is said to occur under water-table conditions. Where, however, the water-bearing formations are overlain by relatively impermeable formations and the water in the aquifers is confined under hydrostatic pressure, artesian conditions exist, and the water levels in wells will rise above the bottom of the confining layer. Under artesian conditions, the water levels in wells tapping the confined aquifers will show the position of the pressure-indicating or piezometric surface. In Boone County, ground water occurs under both artesian and water-table conditions in different places.

The water levels in many wells are recorded in the well tables as depth

in feet below the land surface. Some of these levels are based on drillers' and owners' reports, but many were measured by personnel of the U. S. Geological Survey. The latter measurements are indicated where the water level is shown to the nearest tenth or hundredth of a foot. The elevations of water levels in feet above sea level in the individual wells are shown on plate 5 and figure 5, which also show contours on the piezometric surface or the water table. In some localities the surface shown is the water table but in others it is an artesian-pressure surface. No attempt has been made to distinguish between the two on the map. The contours in the extreme southern part of the county, from Fayette to Jamestown, are questionable because of the scarcity of reliable data.

The elevations of water levels in the shallow wells (that is, wells less than about 32 feet in depth), which include most of the dug wells, were used with caution as a guide in contouring. In general, the water levels in deep and shallow wells fairly close to each other are nearly the same, though in most localities the water levels in the shallow wells are slightly higher than those in the deep wells. The mean difference in water levels between the deep and shallow wells was observed to be approximately 8 feet in 47 localities where a shallow well and a deep well are close together. However, it is believed that the aquifers of Boone County are connected hydraulically even though they may be separated locally by relatively impermeable beds. The lower water levels in the deeper wells indicate that water is moving from the shallow into the deeper aquifers.

The estimated elevation of the water surface of streams near bench marks at various points in the county are shown on plate 5.

An examination of plate 5 shows that generally the piezometric surface and water table conform with the topography and that ground water discharges naturally to Sugar Creek and Eagle Creek. Discharge by evapo-transpiration

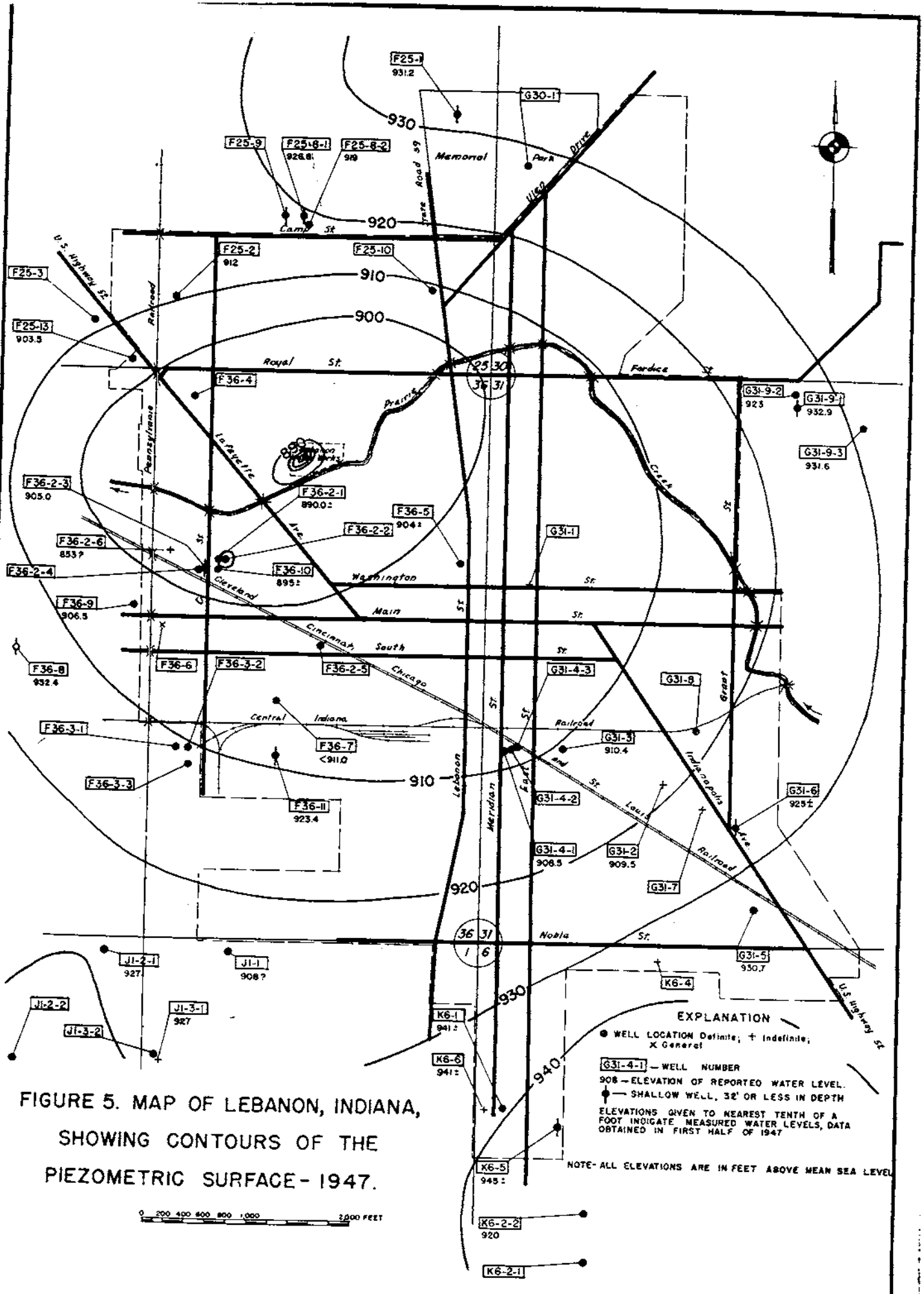

FIGURE 5. MAP OF LEBANON, INDIANA, SHOWING CONTOURS OF THE PIEZOMETRIC SURFACE - 1947.

is discussed later, in the section on observation wells. The effects of pumping at Lebanon and Jamestown are also indicated by cones of depression of the piezometric surface. (See fig. 5 for a more detailed picture of the Lebanon area.) The high points on the piezometric surface in the area surrounding Lebanon indicate possible areas of recharge from rainfall to the ground-water reservoir. The depression in this surface near the center of Tps. 18 and 19 N., R. 2 W., may be due to structural or textural features in the bedrock allowing a relatively high rate of movement of the ground water through it, inasmuch as the bedrock is close to the surface in this area.

There are a number of flowing wells in Boone County. They are located in areas in which the piezometric surface is higher than the ground surface, mainly in valleys. They are indicated in the well records and are shown on plate 5.

The strongest flows noted by the writer were from well BoB29-1-1, which was reported to yield 250 to 300 gallons per minute from a 3-inch casing, and well BoL14-3, which was observed to give about the same yield from a 4-inch casing. Harrell (8, p. 132) reports that three flowing municipal gravel wells at Thorntown (probably wells BoA35-1, 2, and 3), "produce an unlimited quantity of water, estimated as high as one and one-quarter million gallons per day." Capps (4, p. 72) reports that well G-Bo??-33 in 1887 spouted an 8-inch jet of water 7 feet above the well mouth, from gravel at a depth of about 90 feet, which he stated to indicate a flow of over 3,000 gallons per minute.

Comparison of present water levels with those given by Capps (4) in 1907 suggest some general decline in water level. It was not possible to locate many of the wells listed by Capps or to determine the season during which the water level was measured. Records of water levels in past years, except those given by Capps, are almost nonexistent. Of the 19 wells or

areas for which general comparisons could be made, 13 showed net declines in water level ranging from a few feet to as much as 22 feet, 5 showed net rises ranging from a few feet to as much as 8 feet, and 1, near Royalton, showed no net change. The apparent net declines in water level have occurred in the vicinity of towns and cities, where pumpage of ground water is doubtless much greater at present than in 1907.

Capps (4) reported the water level in a well 97 feet deep in Lebanon municipal well field to be about 20 feet below the ground surface. The highest water level in well BoF36-1-6, about 104 feet deep, during 1945, 1946, and 1947, was 42 feet below the surface, in 1947, showing a decline of at least 22 feet in that well, one of the greatest declines reported in the county.

Declines of water levels were noted in other wells in Lebanon. The water level in well BoG31-4-1 was reported to be 17 feet below the ground surface when the well was drilled in 1910. The highest static level measured in recent years was about 40.5 feet. A nearby well (BoG31-2), tapping a different aquifer, had the same general water level (18 feet below the land surface in 1917 when the well was drilled). The hydrograph of this well shows that there was no apparent decline in the water level up to the spring of 1937.

An examination of plate 5, figures 6, 7, and 8, and the well records suggests that the decline of water levels is due primarily, if not almost totally, to pumping, and that cessation of pumping probably would result in a rise of water levels to stages comparable with those when wells were first drilled.

Four wells listed in the records were reported to have "completely drained" when nearby ditches were excavated or deepened; they are wells BoF11-1, BoF22-1-1, BoJ2-1-1, and BoJ26-3. However, nearby wells tapping

the same aquifers as wells BoF22-1-1 and BoI2-1-1 were apparently unaffected. The original water level elevations of these wells agree with the contours of the water table drawn from other water-level elevations on plate 5. It is possible that the wells may have been drained, but it is more likely that the water levels may have declined to a point below the suction of the pumps or that the wells or pumps became plugged or otherwise faulty, suggesting the complete "draining."

OBSERVATION WELLS

Regular measurements of water level were started in wells BoJ23-1-1 and BoK4-1-1 in September and October 1935, respectively, as part of a State-wide observation-well program. These wells are also identified as observation wells O-Boone 1 and O-Boone 2, respectively. The regular measurements were discontinued in October 1941, but occasional measurements were made in 1942, 1943, 1944, and 1945. Regular measurements were resumed in 1945 and have been continued to date in well O-Boone 2. Well O-Boone 1 was replaced by well O-Boone 16 (BoJ23-1-2) in September 1946. These are abandoned shallow wells, less than 25 feet deep, located in areas where there is no apparent effect of pumping from other wells. Graphs of water levels in these wells are shown in figures 6 and 7.

The water levels in these wells usually rise during the winter and spring when losses from evaporation and transpiration are at a minimum and when conditions for recharge from precipitation are favorable. During the growing season, from about the last week in April to the second week in October, losses by evaporation and transpiration are high and ground-water recharge is small, so that the water levels, particularly in shallow wells, generally decline as the ground water moves to lower areas and is discharged into and along the streams. Precipitation during the summer months is seldom effective in raising ground-water levels.

Regular water-level measurements were made in an abandoned well, O-Boone 3 (BoG31-2), in the southeastern part of Lebanon, from October 1935 to April 1937, when the well was destroyed. This well was reported to be about 230 feet deep. The graph of water level in this well, which also appears on figure 6, shows a maximum seasonal range of 8.6 feet for the period of record.

The water-level records for wells O-Boone 4 (BoF36-1-6) and O-Boone 10A (BoF36-1-10A) were obtained by automatic water-stage recorders installed in May and October 1945, respectively. The first well is 104 feet deep and the second, about 216 feet deep; both are abandoned wells in the Lebanon municipal well field of Lebanon Utilities, Inc. (See fig. 9 and well records.) Water-level records for these wells reflect very clearly the effects of pumping from other nearby wells in the same aquifers. Graphs of the water levels at 2 a.m. for each day of record are shown in figure 8. The great decline of the water level of well O-Boone 10A (BoF36-1-10A) in the summer of 1946 is due to the fact that BoF36-1-10 was pumped frequently, starting early in June.

Regular weekly measurements of water levels in wells O-Boone 11 (BoF36-1-11), O-Boone 12 (BoF36-1-12), O-Boone 13 (BoF25-1), and O-Boone 14 (BoG31-2) were started in October 1945. These wells are 193, 142, 18, and 143 feet deep, respectively. The first two are abandoned wells in the Lebanon municipal well field (fig. 9). Their water levels are affected by pumping, that in the latter well to a lesser degree than that in the former, inasmuch as no pumped well of similar depth exists in this field. Well O-Boone 11 also shows the great decline of water level during the summer of 1946, as mentioned above. Well O-Boone 13 is an abandoned well in Grant Memorial Park, on the north side of Lebanon, and well O-Boone 14 is near the water tower in the central part of Lebanon (figs. 2 and 3). Graphs of the water levels of these wells are shown in figure 7; that of well O-Boone 13

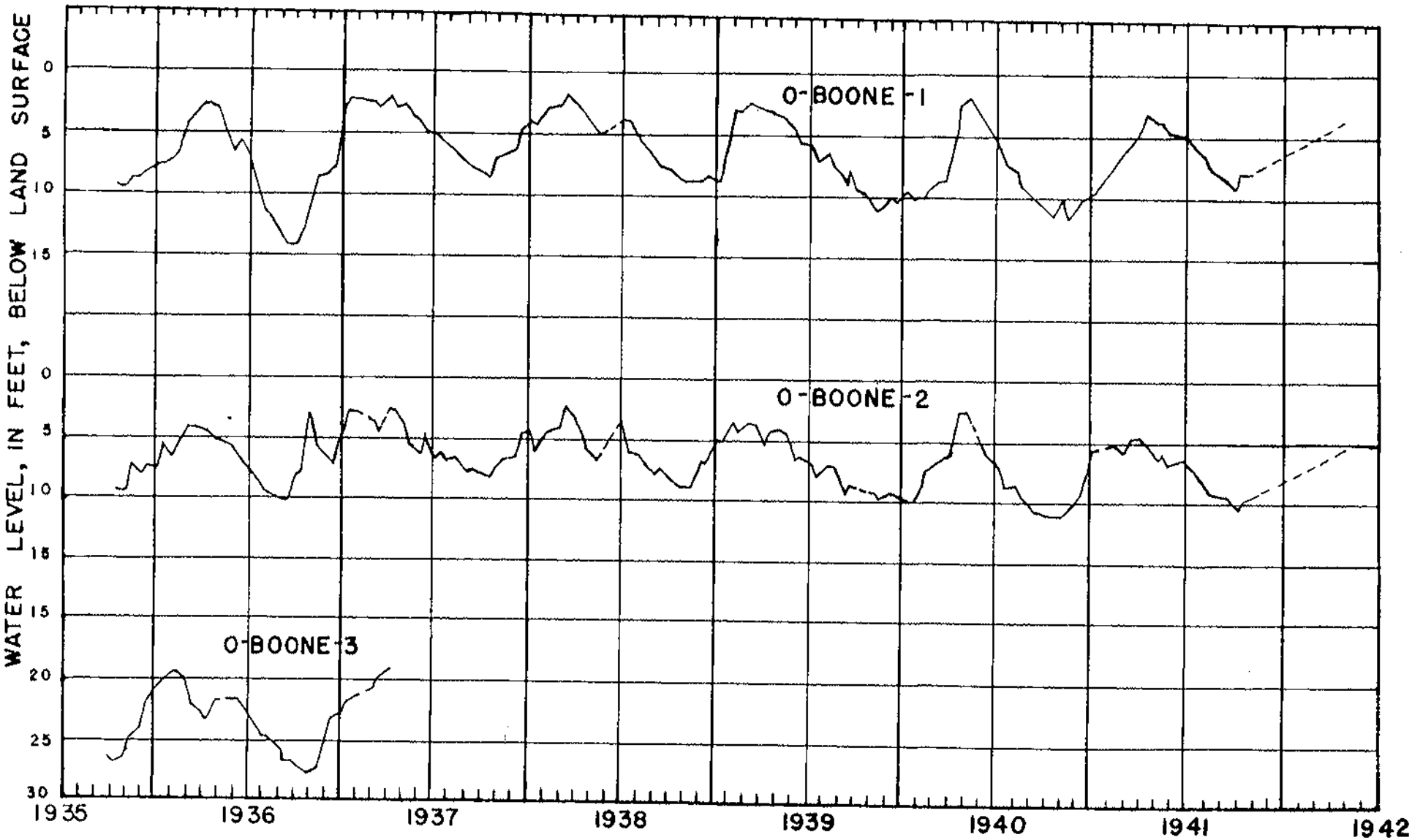

FIGURE 6. GRAPHS OF WATER LEVELS IN OBSERVATION WELLS O-BOONE-1, O-BOONE-2, O-BOONE-3, 1935-42, BOONE COUNTY, INDIANA

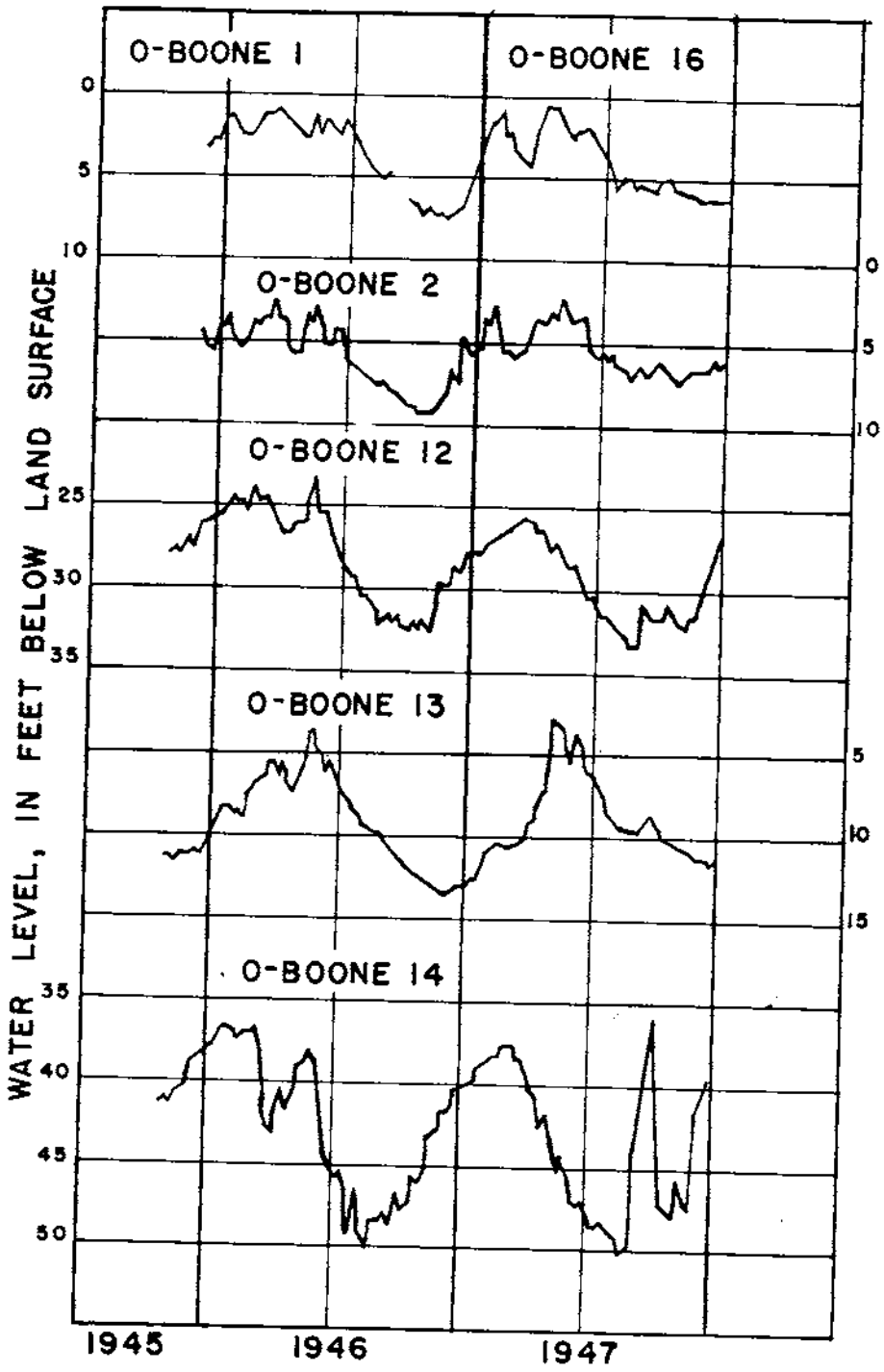

FIGURE 7. GRAPHS OF WATER LEVELS IN OBSERVATION WELLS O-BOONE 1, O-BOONE 2, O-BOONE 12, O-BOONE 13, O-BOONE 14, O-BOONE 16, 1945-47.

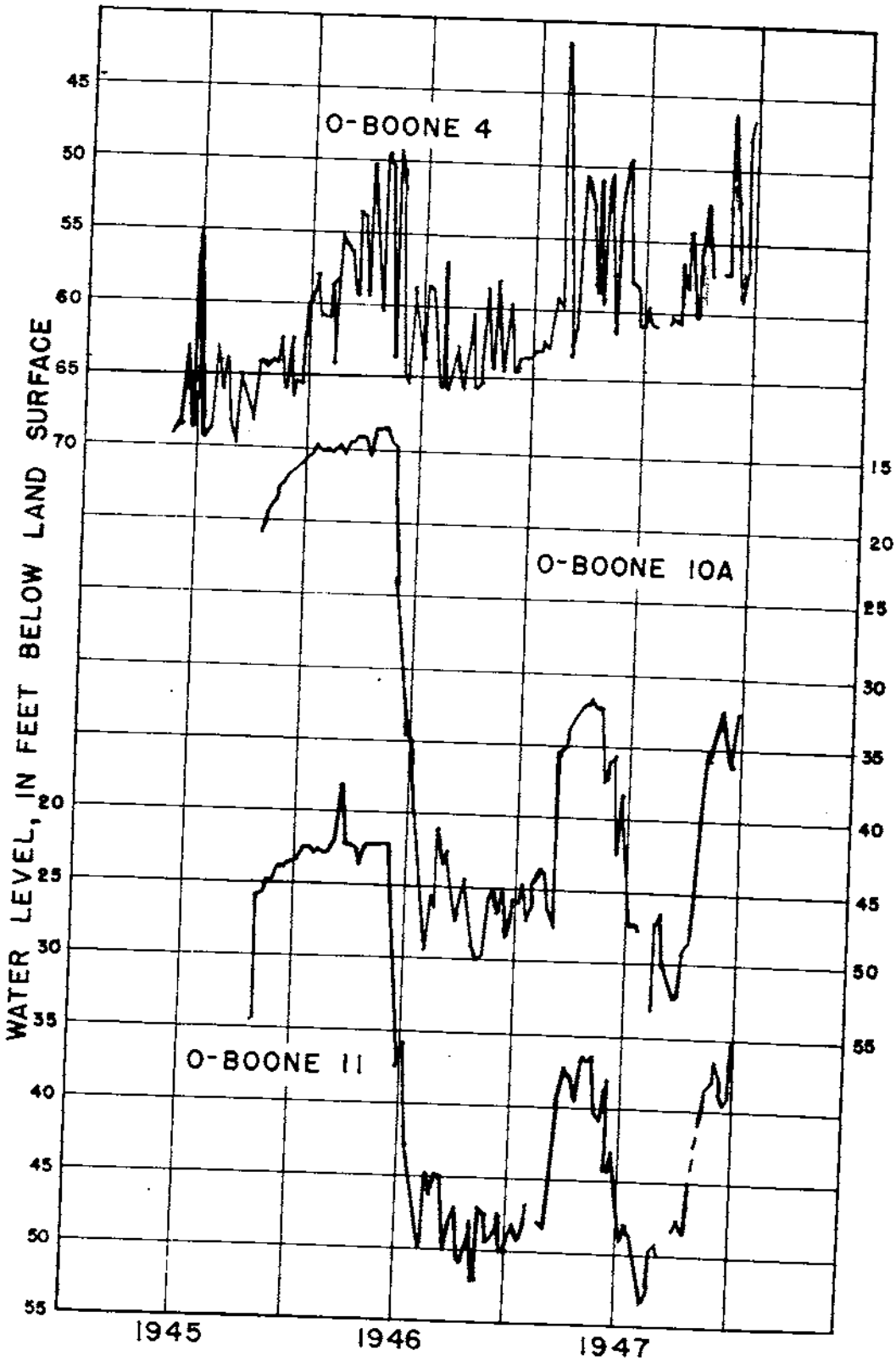

FIGURE 8. GRAPHS OF WATER LEVELS IN OBSERVATION WELLS O-BOONE 4, O-BOONE 10A, AND O-BOONE 11, 1945-47.

is similar to those of wells O-Boone 1, 2, and 16. The pumping of well BoF25-1-2 during the warmer months may possibly affect the water level in well O-Boone 13 to a small extent. The graph of the water level in well O-Boone 14 shows the effect of pumping well BoG31-4-1, a 154-foot well located about 575 feet west of it. Regular weekly measurements of the water level in the latter well, which is pumped during spring, summer, and autumn by an ice company for cooling purposes, were begun in February 1946.

The highest and lowest water levels measured in these observation wells during 1946 and 1947 are listed below as depths in feet below the land surface.

Table 5. Range in water level in observation wells, Boone County, Indiana, in feet below land-surface datum, 1946-47.

Observation well	1946				1947			
	Highest water level	Date	Lowest water level	Date	Highest water level	Date	Lowest water level	Date
O-Bo-1	0.97	3/18	----	--	----	--	----	--
O-Bo-16	----	--	7.29	11/25	0.56	4/21	6.10	11/28
O-Bo-2	2.52	3/15	9.18	10/11	2.15	5/1	7.25	10/18
O-Bo-4	45.50	4/8	67.60	2/16	41.55	2/22	63.35	1/24
O-Bo-10A	13.59	5/10	51.17	10/13	30.14	4/14	54.25	8/14
O-Bo-11	18.18	3/15	52.40	11/1	36.54	4/24	53.42	8/8
O-Bo-12	26.55	5/17	35.98	11/1	25.66	3/14	33.36	8/21
O-Bo-13	3.49	5/24	13.47	12/6	2.83	5/1	12.73	1/10
O-Bo-14	36.70	1/25	50.14	8/23	35.78	10/4	50.02	8/21
O-Bo-15	39.45	3/15	93.67	8/16	40.15	2/14	99.60+	7/18 [a]/ 8/18 [a]/

a/ Measurements discontinued Aug. 18.

It should be noted that in all the wells except wells O-Bo-10A, -11, and -15, which are greatly affected by pumping, both the highest and lowest water levels reached during 1947 were from a tenth of a foot to several feet higher than similar levels reached during 1946, although precipitation at Whitestown during 1946 was greater than during 1947.

The period of record of water levels in Boone County is too short for

the determination of general trends. The records do show, however, that water levels in Boone County in wells unaffected or only slightly affected by pumping have a seasonal fluctuation of about 7 to 15 feet. For this reason, it is necessary to continue regular measurements of water level in wells over a period of years to determine general long-term trends. The seasonal fluctuation in wells O-Bo-10A, -11, and -15 has been considerably greater, ranging from about 18 to more than 60 feet, owing in large part to the effect of pumping.

Early in November 1947 the water levels were measured in wells widely distributed throughout the county. These levels were compared with those measured when the well inventory was made in the first half of 1947. Three wells of the 72 measured showed a rise in water level. These three are deep wells in the Lebanon area, where the fluctuation in the amount pumped would account for the rise. Of these, the greatest rise (18.68 feet), was in well BoF35-1-3. The remaining 69 wells showed a net decline in water level. Twenty-five of these are shallow (approximately 32 feet or less in depth) and showed an average decline of about 4 feet, the greatest decline in a well unaffected by pumping being 5.44 feet, in well BoL23-3-1. Forty-four wells are deep and showed an average decline of $1\frac{1}{2}$ feet, the greatest decline being 4.08 feet, in well BoF34-9, which is affected by little or no pumping. The declines appear to be seasonal, and do not indicate a general downward trend.

UTILIZATION OF GROUND WATER

INTRODUCTION

Because of the relative ease in obtaining small supplies of ground water at low cost, ground water is used more extensively than surface water in Boone County. All the municipal water-supply systems and nearly all the industrial plants that use substantial amounts of water depend on ground water for their source of supply, as do also the rural users. Surface water is used for watering stock and washing gravel. The water used for cooling purposes by the Indiana Condensed Milk Co., in Lebanon is taken from water-filled gravel pits, which constitute, in effect, large dug wells, in the southeast part of town. The Ohio Oil Co. plant in Hendricks County, just southeast of Jamestown, is reported to use a continual supply of water taken from Eel River.

WELL CONSTRUCTION AND OPERATION

There are several common types of water wells in Boone County. A dug well is generally a shallow well consisting of a hole dug in the ground. Most of these wells are lined with some material, such as brick, stone, tile, or wood slats, to prevent caving of the sides. Generally they are several feet in diameter, and tap water-table or shallow artesian aquifers. An unusual dug well is BoF36-1-4, which is 47 feet deep and 30 feet in diameter, and is lined with concrete.

Driven wells are constructed by driving into the ground a small-diameter pipe, usually fitted with a well point and screen on the bottom section, until an aquifer is penetrated or the screen is below the water table. They are usually not deep.

The most common type of well in the county is the drilled well. In recent years most new wells have been drilled because of the speed with

which they can be completed and the greater depths to which they can be constructed. The depths and diameters of these wells vary greatly. Generally in Boone County the well casings are from 2 to 12 inches in diameter, the municipal and industrial wells ranging between 6 and 12 inches, and the more recently drilled domestic wells, 2 to 4 inches. This type of well, in Boone County, is made by drilling a hole with a standard cable-tool rig by the percussion method, through a metal casing driven into the hole, keeping the drilling bit several feet ahead of the bottom of the casing. The rock cuttings are bailed out frequently. When a suitable aquifer is penetrated, the hole is drilled to a desired depth and the bit is withdrawn. In sand and gravel wells a screen may be set in the bottom of the hole and the well is bailed clean. Not all drillers use a screen, nor do all seal the screen to the bottom of the casing. Some drillers pump and surge the well to remove the fine materials from the aquifer surrounding the screen. No screen is used in rock wells, and the casing generally is driven just to or into the rock.

Various types of pumps and power are used on these wells. The driven wells are equipped with pitcher pumps and other types of hand pumps. Domestic and stock wells are equipped with all types of suction and lift pumps, pitcher pumps, and jet pumps, operated manually or by windmill or electric power. Municipal and industrial wells are generally equipped with deep-well turbine pumps or suction pumps, powered by electricity.

WELL-WATER USE

Most of the rural or farm wells are widely scattered throughout the county. Many farms have two or more wells, one for domestic use and one or more for watering stock, cooling milk, and general washing purposes. These wells generally are capable of producing about 10 gallons per minute.

Most of the water from industrial wells is used for cooling purposes, making steam, washing, and domestic uses. These wells are generally in or near towns. Their production varies, ranging from a few gallons up to several hundred gallons per minute. Active industrial wells in the Lebanon area are BoF35-1-7, BoF36-2-2, BoF36-3-2 and -3, BoF36-4, and BoG31-4-1 and -3.

The water from municipal wells is used in a variety of public services, such as domestic, industrial, stock watering, miscellaneous cooling, fire fighting, some irrigating, etc. Towns having municipal water-supply systems, all of which utilize ground water, are Lebanon, Zionsville, Thorntown, Jamestown, and Advance. The wells of these systems are described in the well records and in the following section.

PUBLIC WATER-SUPPLY SYSTEMS

Lebanon

According to Capps (4, p. 73) and the records of the Public Service Commission of Indiana, the municipal waterworks at Lebanon was built and started operations in 1894 at the location on Chicago Street between Klotz and Kersey Streets, just north of Prairie Creek (fig. 9). The water supply was obtained from three wells, 43, 97, and 230 feet in depth. By 1907 four more wells, 97 feet in depth and 8 inches in diameter, were drilled, and one hole was drilled to a depth of 816 feet (BoF36-1-11). This latter hole was reported to have been dynamited at 230 feet in an unsuccessful attempt to make it a productive water well. Capps (4) states that the water was distributed from a standpipe (189,000-gallon capacity) and that a new underground cement reservoir (500,000-gallon capacity) was completed by the end of 1907.

In 1947 the water supply was obtained from wells 1, 2, 3, 4, 7, 8, and 10. The locations of these and other wells at the waterworks field are shown on figure 9. The water from the active wells in the field is pumped

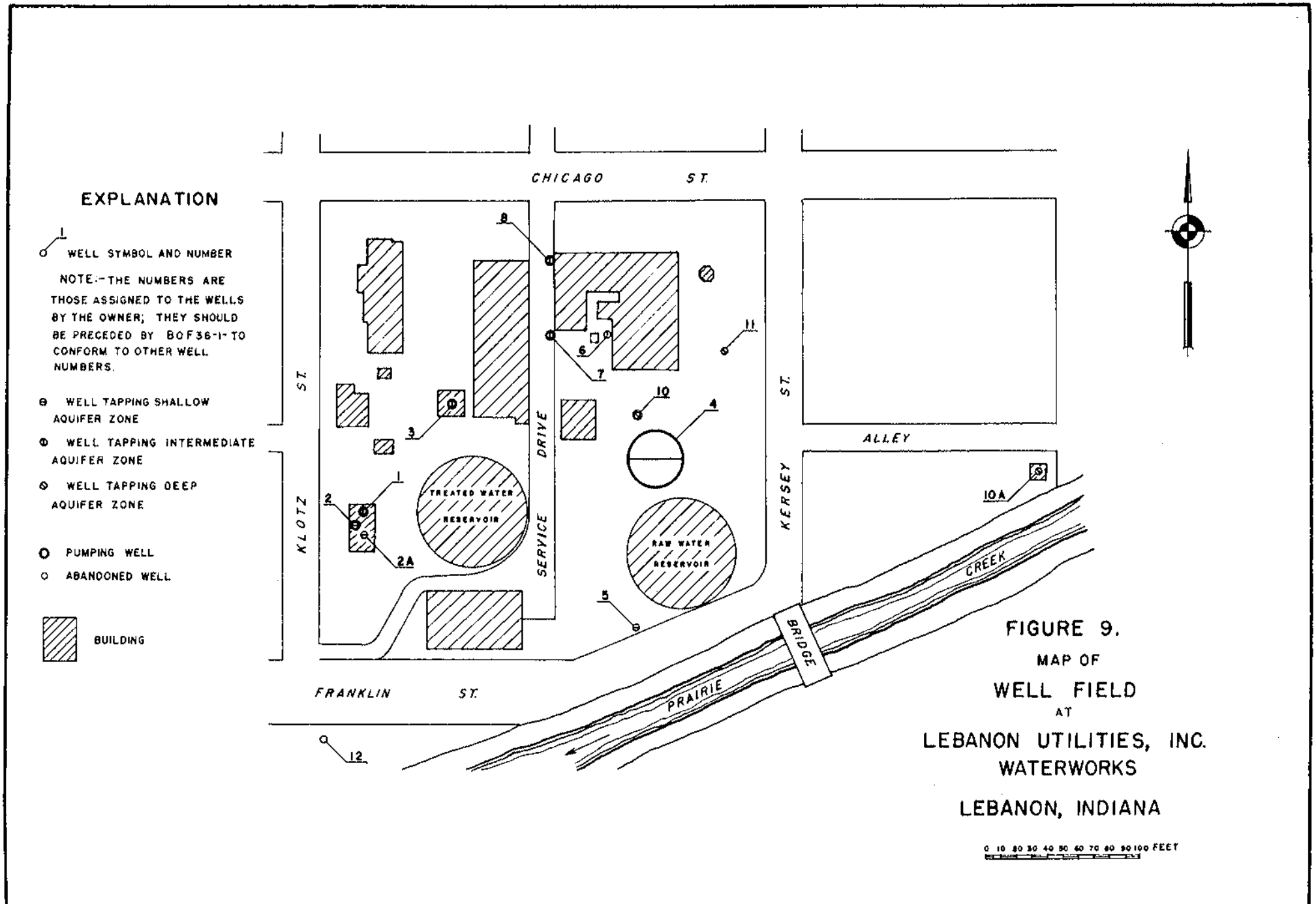

FIGURE 9.

MAP OF

WELL FIELD

AT

LEBANON UTILITIES, INC.
WATERWORKS

LEBANON, INDIANA

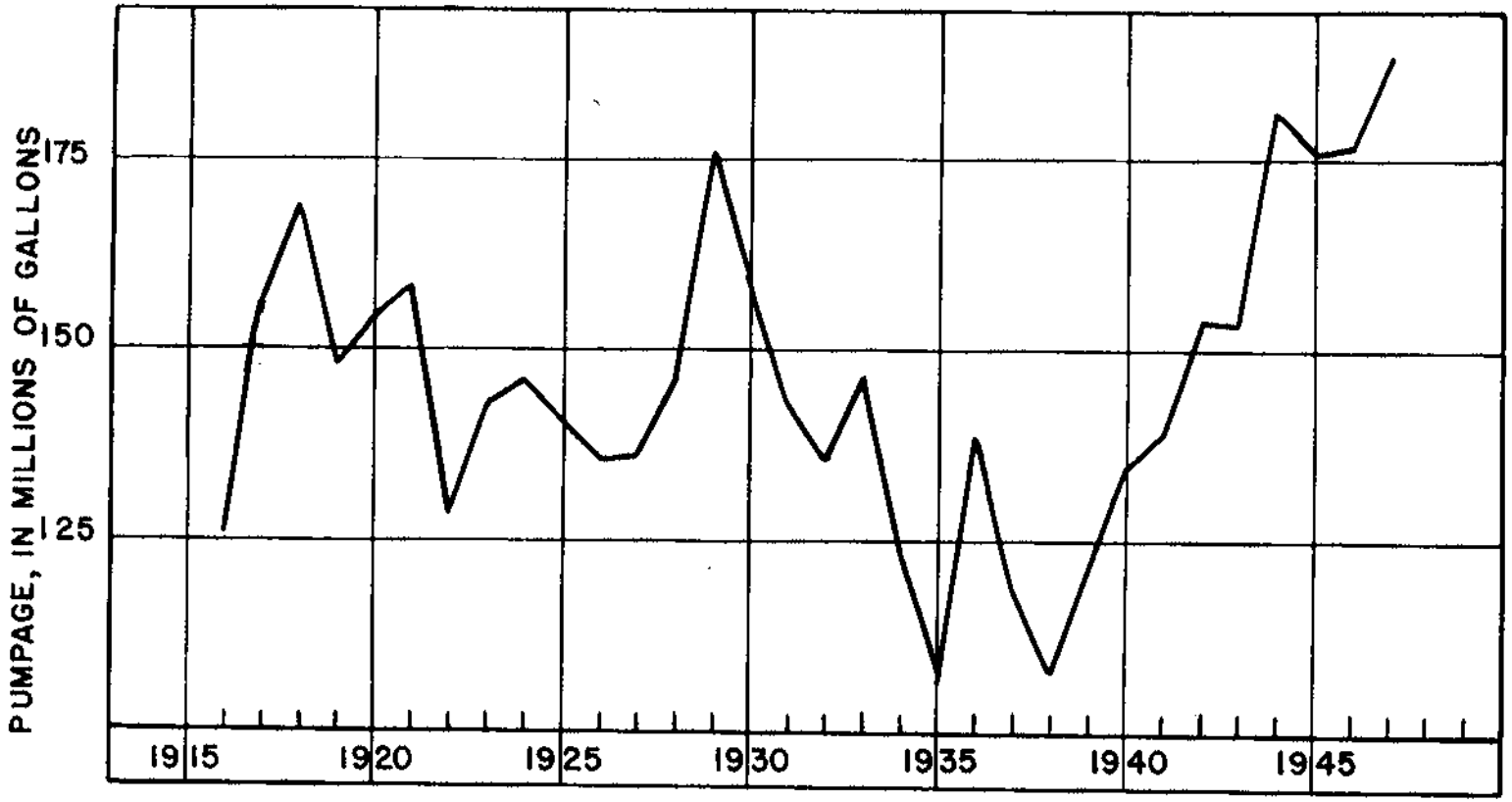

FIGURE 10. ANNUAL PUMPAGE FROM WELLS OF LEBANON UTILITIES, INC. WATER-WORKS, LEBANON, INDIANA.

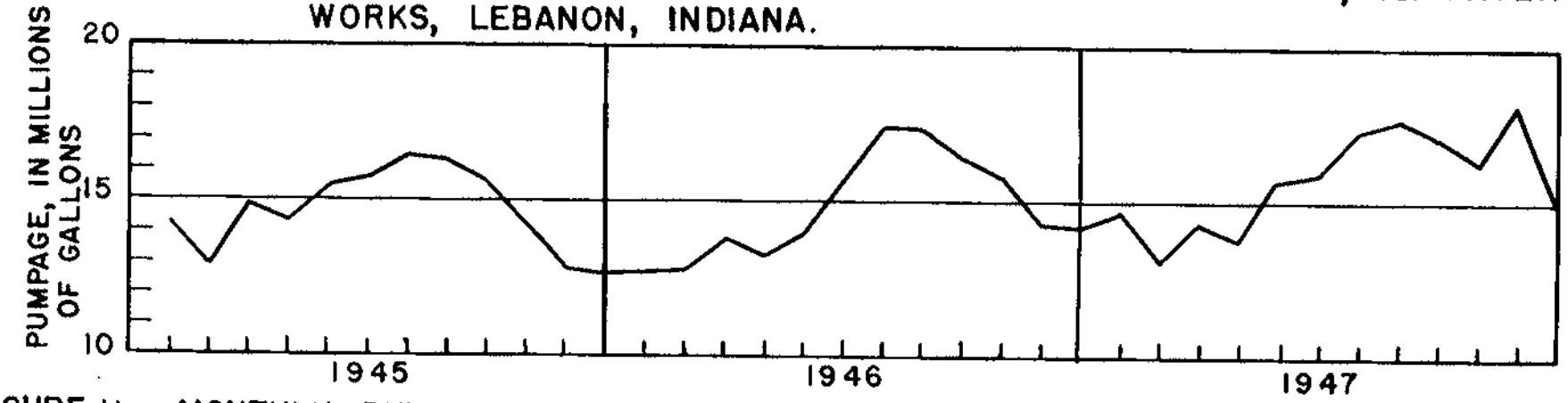

FIGURE 11. MONTHLY PUMPAGE FROM WELLS OF LEBANON UTILITIES, INC. WATERWORKS, LEBANON, INDIANA.

into a raw-water reservoir with a capacity of about 450,000 gallons. Well 4 is pumped only when pumping from the other wells fails to maintain a certain minimum level in the reservoir. The water is then treated and pumped into a soft-water reservoir of about 400,000-gallon capacity, from which it is pumped into the distribution system by high-service pumps. A standpipe, 120 feet high and of a reported 300,000-gallon capacity, in the southeastern part of town, 30 feet west of well BoG13-3, about two-thirds of a mile from the plant, maintains pressure in the system. The treatment consists of iron removal and softening, accomplished by aeration followed by addition of chemicals, coagulation, and sedimentation. Finally the water is chlorinated and pumped into the distribution system.

Within the last several years there have been periods when continual pumping from all the active wells barely produced enough water to satisfy peak demands. Water levels in well 6 (O-Bo-4) indicate that, during 1947, there was almost continuous pumping from its aquifer. Water levels in well 10A (O-Bo-10A) indicate that well 10 was pumped somewhat less than half the time during 1947. This condition is due to increased pumping to meet increasing demands and to declines in yields of the wells. Total yearly pumpage from the entire field for the period of record is shown in table 6 and figure 10. Monthly pumpage for the last 3 years appears in table 7 and figure 11. Declines in yield of the wells are indicated by comparison of reported capacities of the wells at the time they were drilled and those determined by pumping tests during the present investigations. The declines in yield are due, at least in part, to incrustation of the well screens and aquifers near the screens by deposition of minerals and sediment caused by the decrease of hydrostatic pressure, the release of dissolved carbon dioxide, and contact with air. The decrease in hydrostatic pressure is due to the lowering of water levels, which in turn is increased by interference

Table 6. Total annual pumpage, in thousands of gallons, of Boone County municipal waterworks systems

Year	Lebanon	Zionsville	Thorntown	Jamestown
1915	a/ 58,557	b/ 1,029 est.	---	---
1916	126,469	c/ 16,000 est.	---	---
1917	156.419	11,000 est.	---	---
1918	168,081	4,910 est.	---	---
1919	147,773	6,000 est.	---	---
1920	154,610	---	---	---
1921	158,627	---	42,602	---
1922	128,823	---	37,306	---
1923	142,593	---	25,633	---
1924	145,651	4,730 est.	20,097	---
1925	141,539	6,463 est.	17,362	---
1926	135,460	---	16,200	---
1927	136,256	---	19,414	---
1928	146,020	15,580	18,250 est.	---
1929	176,726	9,693	18,250 est.	---
1930	157,958	10,078	25,000 est.	---
1931	143,735	12,900	17,863 est.	---
1932	135,265	---	18,064	---
1933	146,567	---	15,105	---
1934	122,746	---	11,420	---
1935	105,390	---	10,714	---
1936	138,037	---	13,548	---
1937	118,306	---	---	---
1938	107,566	14,637	---	---
1939	120,690	16,598	---	---
1940	134,761	19,912	---	---
1941	139,261	20,193	---	---
1942	153,757	22,578	---	---
1943	153,561	24,109	---	---
1944	181,374	23,385	---	5,475
1945	175,474	22,418	---	5,475 est.
1946	176,900	27,004	---	5,475 est.
1947	188,519	---	---	---

a/ Pumpage from end of June to end of year.
b/ Pumpage from June 30, 1914, to June 30, 1915.
c/ Pumpage from June 30, 1915, to June 30, 1916.
est. Estimated pumpage.

Table 7. Monthly pumpage, in thousands of gallons, of Lebanon Utilities, Inc. waterworks

	YEAR		
MONTH	1945	1946	1947
January	14,287	12,651	14,536
February	12,908	12,772	13,084
March	14,790	13,740	14,219
April	14,335	13,200	13,896
May	15,419	13,943	15,664
June	15,640	15,606	15,909
July	16,490	17,343	17,143
August	16,458	17,298	17,546
September	15,612	16,352	17,157
October	14,218	15,573	16,230
November	12,750	14,219	18,185
December	12,567	14,201	14,949

between closely spaced wells. The maximum distance between wells pumping from the same formation is only about 200 feet (wells 1 and 8).

In 1943 an attempt was made to increase the yield of the well field by acidizing wells 1, 2A, 7, and 8. Before acid treatment, well 7 was reported to yield about 75 gallons per minute with a 33-foot drawdown, giving a specific capacity of 2.3 gpm per foot of drawdown. After acidizing, the well yielded 200 gpm with a 14-foot drawdown and had a specific capacity of 2.3 gpm per foot of drawdown. After acidizing, the well yielded 200 gpm with a 14-foot drawdown and had a specific capacity of 14.3 gpm per foot of drawdown, an increase in well efficiency of more than 600 percent. The yield of well 2A was not materially improved and the well was abandoned.

The information on the aquifer is gained mainly from information on the depths of wells and on screen settings. There appear to be three main zones of aquifers in the area of the municipal waterworks, as indicated by the common 50-, 104-, and 220-foot (approximate) depths of wells. Apparently these water-bearing zones are separated by glacial drift composed mainly of bluish-gray boulder clay. The shallow zone is tapped by wells 2A, 2, 4, and 5, as indicated on figure 9. Of these, only wells 2 and 4 are active. The elevation of the top of this zone is about 885 feet above sea level except in well 5, in which there is evidently either 9 or 21 feet of gravel, the top of which is at an elevation of 877± feet.

The intermediate zone is tapped by wells 1, 3, 6, 7, and 8, of which all but well 6 are active. Most of the production of the field comes from this zone. The elevation of the top of this zone and its thickness in these wells vary greatly, according to the records, ranging from an elevation of about 833 feet to 863 feet above sea level.

The deep zone is tapped by wells 10A, 10, and 11, of which only well 10 is active. The elevation of the top of this zone, which is about 8 feet thick, is approximately 710 feet. The only record of the aquifer of well 12 is that the well was reported to have been drilled to a depth of 185 or 145 feet. It was measured and found to be 142 feet deep. The hydraulic characteristics of these wells and of the aquifers they tap, and relations between aquifers, are discussed in the section on quantitative hydraulic characteristics.

Zionsville

It is reported that the municipal waterworks of Zionsville began pumping water from a well 27 feet deep on January 1, 1914. No storage or treatment of the water was maintained. About 1922 a new well was drilled to a depth

of 110 feet and it subsequently flowed. In 1931 the waterworks was operating two wells (one 20 feet deep and 10 feet in diameter, and one 140 feet deep and 6 inches in diameter) yielding about 50,000 gallons per day. In 1937 a well (BoP2-1-3), about 70 feet deep, was drilled at the city building on the southwest corner of Cedar and Elm Streets. Owing to a decrease in yield from 75 to 25 gallons per minute, probably due to incrustation, another well (BoP2-1-4), 74 feet deep, was drilled in 1939 at the present pumping station on the west side of Elm Street between Pine and Hawthorne Streets. The yield of this well has decreased from an original 200 gallons per minute with a 5-foot drawdown to 125 gallons per minute with a 4-foot drawdown in July 1947. The latter well is used for the town supply and well BoP2-1-3 is used only in emergencies. The water is chlorinated and pumped into the distribution system. A 100,000-gallon elevated steel tank, located on the uplands on the west side of town, maintains pressure in the distribution system.

Thorntown

In December 1909 the municipal waterworks began pumping water from a well (BoA35-1-1), 96 feet deep, located at the original pumping plant on the west side of Pearl Street midway between Main and Bow Streets. The water was pumped into the distribution system, including an 18,000-gallon reservoir 3 feet below the station level and a 40,000-gallon elevated tank, 85 feet high, at the plant. In 1916 a new well (BoA35-1-2) was drilled to a depth of either 103 or 113 feet, close to the original well. Both these wells were supplying the town in 1920. In 1923 another well (BoA35-1-3), 110 feet deep, was drilled in this same locality. According to records of the Sanborn Map Company of New York, on file at the Thorntown city building, all three of these flowing wells were pumped by two Dean duplex double-acting steam suction pumps in September 1926, the water being pumped to the

system described above. Drillers and natives of Thorntown claim that a deep (almost 1,000 feet) test well (BoA35-1-4) drilled between 1920 and 1930 was unsuccessful. In 1928 two new flowing wells (BoA35-1-5 and -6), about 70 feet deep, were drilled in the valley of Prairie Creek at the base of the upland slope east of Front Street, in line with Church Street extended. The new station was electrified and equpped with three centrifugal pumps. A 50,000-gallon elevated steel storage tank at the old plant location maintains pressure in the distribution system. The flow of well BoA35-4, 150 feet south of the present municipal wells, is intermittent because of the pumping of those wells.

Jamestown

In 1939 and 1940 the waterworks at Jamestown was built and a 56-foot well (BoM10-6-1) was drilled in the eastern part of town in a lot between the railroad and State Highway 34. A 75,000-gallon elevated steel tank, 100 feet high, was built 2,300 feet west-northwest of this well, on higher ground. In 1941 a second well (BoM10-6-2) of similar depth was drilled about 70 feet north-northwest of the first. Water from these wells was pumped by electric deep-well turbine pumps into the distribution system. The two wells supplied sufficient water to meet the needs of the town until about the middle of 1947. About 1941 two unsuccessful wells had been drilled in an attempt to augment the supply. They are well BoM10-6-3, 100 feet deep, near the storage tank, and well BoM10-6-4, 185 feet deep, in the southwestern part of town. In 1946 another attempt to obtain more water was made by drilling well BoM10-6-5 midway between the two original wells, to a depth of 512 feet. It also was a failure. In July 1947 well BoM10-6-6 was drilled about 800 feet east of the two pumped wells. It was originally drilled to 105 feet, but it was finally made into a supply well at a depth of 31 feet. It was reported to yield 50 gallons per minute with a 9-foot drawdown after

approximately 8 hours of pumping. Plans were made to put this well in operation in the last half of 1947, as a replacement for well BoM10-6-2. The water from well BoM10-6-2 and from the original waterworks wells was being chlorinated in July 1947, although State records show no treatment in earlier years. It is noteworthy that this well is located in a small area of Fox silt loam (which is usually underlain by sand and gravel) in the southeastern part of Jamestown (see pl. 1). It should also be noted that this hole, as well as others in Boone County, such as BoF35-1-7 and BoL19-4-2, was successful at a shallow depth after deeper unsuccessful holes had been drilled. This indicates the importance of attempts to develop wells in water-bearing formations that do not appear at first to be satisfactory aquifers.

Advance

The town of Advance had one or more public wells as early as 1907. Capps (4, p. 76-77) reports a 2-inch limestone well (BoI23-1), 90 feet deep, half a square south of the railroad station. Two other public wells in the center of town, equipped with hand suction pumps, apparently were drilled early in the century. One of these is well BoI22-2.

In the latter part of 1946 construction of a municipal waterworks was begun. A 6-inch test well, BoI23-3-1, was drilled to a depth of 38 feet in the southeastern part of town. Upon recommendation of the Indiana State Board of Health, a well (BoI23-3-2) for the municipal supply was drilled at a location 50 feet south of the test well, to a depth of 45 feet, but did not produce a satisfactory yield; the original well was reamed to a diameter of 10 inches and plans to use it as a source of supply were made. It was reported to have a 23-foot drawdown after 24 hours of pumping 74 gallons per minute.

Available pumpage records for the municipal water-supply systems in Boone County are shown in table 6.

QUALITY OF WATER

In general, ground water in Boone County is of good quality from a bacteriological standpoint and only moderately high in mineral content. Most wells yield calcium bicarbonate water, which is hard and usually quite high in iron content. Of the drilled wells for which records were obtained, the water from only two (BoF25-3 and BoL10-1-2) was reported to have been rejected for human use by the Indiana State Board of Health on the basis of bacteriological analyses. The former yields water containing rust- to flesh-colored soft material resembling skin and mucous discharge. Well BoL10-1-2 was a flowing well that yielded water that was clear but had a "sulfur odor." Both wells probably tap gravel aquifers; they are 85 and 109 feet deep, respectively.

The water from the majority of the wells is relatively hard and high in iron content. Records of chemical analyses of ground water are limited largely to waters of wells furnishing municipal supplies. These records are found in Capps' report (4) and in the files of the Indiana State Board of Health.

Most of the analyses of the Lebanon supply were of water from the raw-water supply. Those in recent years (1931 to 1947) show an iron content ranging from about 0.5 to 3.0 parts per million (average, 1.2 parts), an alkalinity ranging from 344 to 396 parts as calcium carbonate, and a total hardness ranging from 280 to 494 parts, also expressed as calcium carbonate. Dissolved solids were 352 and 622 parts per million, according to analyses made in 1907, and 512 and 793 parts, according to analyses made in 1934. From two sets of analyses (made in 1935) of waters from different wells, the order of wells, arranged from low to high in iron, alkalinity, and hardness, is BoF36-1-1, -6, -8, -3, -10, -4, -9, -5, and -2. It is noteworthy that the wells tapping the intermediate aquifer are first in this order (the water

is best) and those tapping the shallow zone are last; and that, of those tapping the intermediate zone, the ones on the periphery of this group of wells are first, and those toward the center, last.

Analyses of the Zionsville water supply made from 1930 to 1946 show the following ranges: iron, 0 to 11 parts per million; alkalinity, 148 to 430 parts; total hardness, 73 (?) to 521 parts. The chloride content decreased at the end of 1939 and remained low through 1946.

Analyses of the Thorntown water supply, made from 1931 to 1946, show the following ranges: iron, 0 to 9.6 (?) parts per million; alkalinity, 322 to 420 parts; total hardness, 364 to 488 parts. The chloride content decreased here also in 1940 and remained low through 1946.

Analyses of the Jamestown water supply, made in 1942 and 1946, show the following ranges; iron, 1.2 to 2.0 parts per million; alkalinity, 328 to 356 parts; total hardness, 258 to 269 parts.

Analyses of water from municipal wells in Advance, made in 1946 and 1947, show the following results: iron, 5 and 10 parts per million; alkalinity, 370 and 400 parts; total hardness, 338 and 354 parts, respectively.

The above records show that the average iron content of ground water in Boone County is about 1.2 parts per million or higher, and that the hardness in most places is over 300 parts. The Jamestown analyses show the lowest hardness.

The high iron content of practically all well water is evidenced by the rust-colored deposits on equipment that it contacts. The runoff streams from flowing wells have deposited much rust-colored material along their channels.

Wells yielding water that is obviously sulfurous are BoA35-1-4 and -5, BoF36-1-7 and -8, BoJ2-1-1, BoL10-1-2, and BoM6-1. The water from the last well has a very peculiar taste. It is reported to be purgative, and to de-

posit a black film on metals it contacts. It is obtained from bedrock, as is the water from wells BoF31-1 and BoL14-2. The water from well BoL14-2 becomes milky with precipitated iron on standing. The water in well BoF34-10, which taps bedrock, was reported to be very highly mineralized and especially high in iron when the well was drilled, but it improved considerably in quality after it was used for several months.

On the basis of measurements made by the author during 1947, the mean ground-water temperature in 21 wells and 3 springs rather well distributed in the county was found to be about 52.50° F. This is 1.2° F. higher than the mean annual air temperature as determined at the U. S. Weather Bureau station at Whitestown. These measurements were made at various times during the year. The difference in temperature between summer and winter measurements was found to be 1° F. in well BoL14-3 and 1½° in spring BoL25-2. The water in well BoE31-1, which flows, was measured at 52° in the summer of 1947.

This is probably the same well which Capps (4, p. 76) reports yielded water with a temperature of 51° in 1907. The temperature of 50° F. reported by Capps in well BoB?-40 in (1907) is the lowest ground-water temperature reported in the county. The lowest temperatures found in 1947 were in wells BoG12-1, BoH21-1-2, and BoE23-1-2 and were 51¼° F., 51¼° F., and 51-3/4° F., respectively. The highest temperatures were found in wells BoH16-1, BoH14-1, and BoG27-1 and were 57° F., 54° F., and 53½° F., respectively. It is noteworthy that the two coldest waters and the two warmest waters measured are in the same general area, the former occurring in gravel wells 20 and 40 feet deep, and the latter in limestone wells 216 feet deep.

QUANTITATIVE HYDRAULIC CHARACTERISTICS OF WATER-BEARING MATERIALS

INTRODUCTION

Pumping a well in a water-bearing formation causes water levels to decline in the vicinity of the pumped well. The amount of water-level decline caused by pumping a well at a given rate depends upon the hydraulic characteristics of the formation, including the coefficients of storage, permeability, and transmissibility, the areal extent of the formation, and the rate and distribution of recharge to and natural discharge from the formation. The coefficients of storage, permeability, and transmissibility are determined by field or laboratory tests. The other significant factors involved must be determined from analysis of geologic, hydrologic, and climatic data.

DEFINITIONS

The coefficients of storage, permeability, and transmissibility of the formation are hydraulic characteristics and define the ability of the formation to store and transmit water.

In the zone of saturation, all connected spaces between the rock particles are filled with water. When the water table is lowered, the voids in the zone of lowering are partially drained under the influence of gravity, but the rest of the water is held to the surfaces of the rock particles by molecular forces. The ratio of (1) the volume of water released from storage by gravity flow to (2) the total volume of the drained rock (including the voids) is called the specific yield of the formation. The specific yield is a measure of the stored water available for withdrawal from the formation under water-table conditions. The ratio of the water retained by molecular forces to the total volume is the specific retention.

The ability of an artesian formation to store water is indicated by its coefficient of storage. When the hydrostatic pressure in the artesian for-

mation is reduced, a resultant compression of the beds occurs, accompanied by the release of a relatively small quantity of water. The coefficient of storage is the amount of water, in cubic feet, released from a vertical column of the formation with a base 1 square foot in area, when the hydrostatic pressure is reduced 1 foot.

The ability of a material to transmit water is indicated by its coefficient of permeability, which may be expressed quantitatively as the volume of water, in gallons a day, that will pass through a cross-sectional area of 1 square foot of material under a hydraulic gradient of 1 foot per foot at a temperature of 60° F. The coefficient of permeability of a formation is dependent mainly on the uniformity of size, shape, sorting, and packing of the individual particles. The field coefficient of permeability is that corrected to the local ground-water temperature.

The coefficient of transmissibility of a given formation is the product of the field coefficient of permeability a d the saturated thickness of the formation and is expressed as the quantity of water, in gallons a day, at the prevailing temperature, that will pass through a vertical section of the formation 1 foot wide under a hydraulic gradient of 1 foot per foot, or through a section of the formation a mile wide under a gradient of 1 foot per mile. The coefficients of transmissibility and storage define, in part, the ability of a formation to serve as an aquifer.

A term that is useful for comparing well efficiency and performance is the specific capacity of a well, the yield per unit of drawdown, generally expressed as gallons per minute per foot of drawdown. A well yielding 200 gallons of water per minute with a drawdown, or lowering of water level due to pumping, of 20 feet would have a specific capacity of 10 g.p.m. per foot of drawdown. Inasmuch as the specific capacity of a well changes with time until "equilibrium" or steady-flow conditions are reached, values of specific

capacity should be determined at the end of a specified period of pumping in the group of wells to be studied.

PUMPING TESTS

The drawdown in the vicinity of a pumped well is the amount the water level is lowered as a result of pumping the well. The drawdown in the formation is less with increasing distance from the pumped well, and increases at a diminishing rate as the period of pumping is extended. The drawdown in the vicinity of the pumped well, the distance from the pumped well to the observation point, and the rate and duration of pumping are mathematically related to the coefficients of transmissibility and storage of the formation.

The coefficients of transmissibility and storage are determined in the field by pumping one or more wells at a constant rate and observing the changes in water levels in nearby idle wells. The data collected in the field are analyzed by several available methods. The most valuable formula available at the present time for use in the analysis of pumping-test data is the Theis nonequilibrium formula, for it can be used to determine the hydraulic characteristics of the formation from comparatively short pumping tests. The interested reader is referred to Wenzel (19) for a detailed discussion and explanation of pumping-test methods.

The equations generally used for obtaining the hydraulic characteristics of aquifers from pumping-test data are all based on similar assumptions and should yield the same results if the limitations of each equation are kept in mind. In applying the Theis nonequilibrium formula, it is tacitly assumed that the hydraulic properties of the formation are constant over an infinite area, and that there is no recharge to or natural discharge from the formation throughout the test. These assumed conditions rarely exist in the field, and use of the pumping-test results should be applied within limits according to the facts known about the formation tested. The aquifers in

Boone County, as indicated in this report, are believed to be very heterogeneous and poorly connected at many points, and many are perhaps of small areal extent. The use of the pumping-test results in this county is therefore generally limited to comparison studies of the formations tested. Although the use of test data is limited, pumping tests combined with other hydrologic and geologic data serve as a valuable guide in selecting the formation that will yield the maximum quantity of water with the least drawdown.

Pumping tests were made at the Lebanon municipal well field in February 1947 to determine the hydraulic properties of the aquifers tapped by the municipal wells. Well 10 (see fig. 9) in the deep zone was pumped at an estimated rate of 95 gallons per minute, and then allowed to recover for about 5 days. Water-level changes were observed in wells 10A and 11. The coefficients of transmissibility and storage of the deep zone were determined by means of the Theis nonequilibrium method to be approximately 7,000 gallons per day per foot and 2.0×10^{-4}, respectively.

In the intermediate zone, wells 1, 3, and 7 were pumped for about 6 hours each. Each pumping period was begun after water levels had become relatively stable. Water-level measurements were made in wells 1, 3, 6, and 7. From the interference and drawdown data collected during the tests, the coefficients of transmissibility and storage were computed to be about 10,000 gallons per day per foot (g.p.d./ft.) and 5.7×10^{-4}, respectively.

The yields, observed and computed drawdowns, and specific capacities of wells in the intermediate zone observed at the end of a 6-hour pumping period are given in table 8.

The computed drawdowns given in table 8 were determined by means of the Theis nonequilibrium formula, using the hydraulic characteristics calculated from the interference data, and the screen diameters. The computed

Table 8

Pumping-test data on wells in the intermediate zone, Lebanon Utilities, Inc., well field, Lebanon, Ind.

Well No.	Yield (g.p.m.)	Observed drawdown (feet)	Computed drawdown (feet)	Specific capacity 6-hour pumping period (g.p.m./ft.)
1	125	11.9	22.2	11.0
3	108	13.6	19.1	9.5
7	97	33.8	17.2	2.9

drawdown here accounts only for the drawdown in the formation at the well-screen face, assuming all flow in the formation to be laminar. However, an additional head loss, often called well loss, occurs in the pumped well by turbulent flow through the screen and up the casing to the pump intake, and by turbulent flow near the screen where the induced ground-water velocities are high. Incrustation of the screen and of the formation surrounding the screen may also cause observed drawdowns to be greater than the computed drawdown given. Generally the drawdown computed from the Theis formula and interference data is less than the drawdown observed in the pumping well, because well loss is not included in the computed drawdowns. The figures shown for well 7 show this clearly.

The data given for wells 1 and 3 show an observed drawdown much less than that computed, and the specific capacities of these two wells are almost twice as high as the theoretical value based on the interference data. This apparent anomaly may be due to heterogeneity of the water-bearing material, perhaps to a lens or stringer of highly permeable materials at the locations of wells 1 and 3; or to an increase in permeability near the wells due to removal of fine particles during the well construction, so that the effective diameter is larger than the nominal diameter.

Well 2 in the shallow zone was pumped at a rate of about 30 gallons per minute, and depths to water were measured in well 5. However, the slight effects on water levels noted at well 5 were not sufficient to permit computing definite values of the hydraulic characteristics, and the results of the tests were inconclusive.

SUMMARY OF RESULTS

As no quantitative data could be obtained from the existing wells in the shallow zone, its potentialities are known only from past experiences. The intermediate zone is better than the deep zone, considering individual well performance and interference. Test drilling near well 1, and a detailed analysis of the materials removed from the test holes, may substantiate or disprove the assumption made regarding the existence of the highly permeable lens in the intermediate zone.

The tests at the municipal well field indicate that the three water-bearing zones in the areas are not connected within some distance from the wells; that is, that the clays separating the zones are continuous over a rather broad area. Maintenance difficulties experienced in the past with the operation of wells in the shallow zone indicate that the shallow zone is of little value as a source of water supply from the standpoint of both quantity and quality.

The tests made at the municipal well field may not be used as a basis for extended predictions of water-level trends or of the perennial yields of the zones now in use. However, they do serve to demonstrate the relative abilities of the formations to transmit water, and to indicate features of the formations that might be explored and exploited. Reference is made to the assumed lens of highly permeable material in the intermediate zone. Wells screened in this material produce from 300 to 500 per cent more water than wells in the deep zone, or wells in the intermediate zone which ap-

parently do not tap the assumed lens. The value of these tests cannot be emphasized too strongly in any future exploratory work. Detailed pumping tests in conjunction with the geolo ic logging of formations provide an excellent means of obtaining quantitative data for precise comparisons of the abilities of formations to transmit water to wells.

THE GROUND-WATER RESERVOIR IN BOONE COUNTY

The generally thick mantle of glacial drift that contains many deposits of sand and gravel at different levels within the drift of Boone County constitutes a large underground reservoir in which many millions of gallons of ground water are stored. Although the individual beds of sand and gravel appear to be discontinuous, horizontally and vertically, they are apparently connected hydraulically from place to place, so that water may pass slowly from one permeable bed to another. Although clay and glacial till are usually considered "impermeable," permeability is a relative term and water apparently may pass through clays and glacial tills at very slow rates of movement. It is believed that the glacial deposits of Boone County may be considered as a unit from the standpoint of ground-water storage. Water is added to the reservoir by recharge from precipitation and is withdrawn from ground-water storage by natural discharge into streams, by evaporation and transpiration, and by discharge from wells. The water levels in wells indicate in a general way the extent to which the underground reservoir is full.

The amount and seasonal distribution of precipitation and the comparatively flat topography present favorable conditions for recharge. The flat surface has the effect of retarding surface runoff. However, the surface of most of the county is underlain by clayey and silty soils and by glacial till, which are relatively impermeable, and the average recharge per unit area is therefore relatively small.

In an effort to evaluate the average annual recharge of water to the ground-water reservoir in Boone County, computations of the base flow of Sugar Creek at Crawfordsville and of Eagle Creek at Indianapolis were made by L. M. Furness, Surface Water Division, U. S. Geological Survey, at the request of the writer. The base flow or ground-water runoff of a stream is

the quantity of water contributed to the stream by natural discharge of ground water and is approximately equal to the average annual recharge in the area drained by the stream. The ground-water runoff represents water that cannot be stored and therefore overflows into the surface stream, because the ground-water reservoir is already full in the vicinity of the stream.

The hydrologic analysis by Mr. Furness showed that the ground-water runoff of Sugar Creek at Crawfordsville was about 3.8 inches per year and of Eagle Creek near Indianapolis, about 2.9 inches per year. This is equivalent to an average annual recharge of about 180,000 and 138,000 gallons per day per square mile, respectively. It is estimated that the average annual recharge in Boone County is about 3.0 inches or about 143,000 gallons per day per square mile. According to this estimate and to the amount of direct surface runoff shown by the stream-gaging records, the total precipitation of nearly 39 inches in Boone County is dissipated in the following proportions: Surface runoff about 19 per cent, ground-water runoff or base flow about 8 per cent, and losses by evaporation and transpiration about 73 per cent. The percentage of ground-water runoff is relatively low, as compared to that for many other areas of Indiana, as might be expected from the clayey nature of the soils, and the losses by evaporation and transpiration are relatively high because of the shallow water table and slow surface drainage in many parts of the county.

The total annual pumpage of ground water through wells in Boone County during 1947 was estimated to be about 500 million gallons, or about 1,370,000 gallons per day. Of this amount about 250 million gallons, or about 50 per cent, was used for municipal supply, about 25 million, or about 5 per cent, was used for industrial supply, and the remaining 225 million gallons, or 45 per cent, was pumped from private wells for domestic and agricultural

purposes. About 200 million gallons was pumped from wells in the Lebanon area, 190,000 of which was pumped for municipal supply.

In addition to the pumpage of ground water, a large quantity of ground water is wasted through flowing artesian wells. One well, reported to flow about 1,000 gallons per hour, would discharge 8,760,000 gallons of water in a year if the flow remained constant. It is estimated that about 200,000,000 gallons of water was wasted in Boone County during 1947 from uncontrolled flowing wells.

The available records of ground-water levels indicate no large decline of water levels in wells in Boone County except in the vicinities of the larger cities, towns, and industrial plants, where the declines have been due to heavy pumping from closely spaced wells. Such declines are necessary in order to draw water to the wells. Throughout most of the county, the ground-water level is not far below the land surface at present and, although long-term records are scarce, the decline in ground-water levels appear to have been comparatively small. Some decline may have been caused by artificial drainage and by the uncontrolled discharge of flowing wells.

The average annual recharge to the ground-water reservoir is many times greater than the annual withdrawal of ground water through wells. Ground-water levels are not far below the land surface and, in general, the ground-water reservoir is relatively full. It is believed that much of the natural discharge into streams could be salvaged and put to beneficial use by the development of properly located well fields near the stream valleys.

FUTURE DEVELOPMENT OF GROUND-WATER SUPPLIES

It has been shown that the ground-water supplies of Boone County have not been fully developed and that additional supplies may be developed in the county without exceeding the safe yield of the water-bearing formations. This general conclusion is based on a study of the county as a whole and may not be true in certain localized areas.

Although some rock wells, such as wells BoF31-1 and BoF34-9, are reported to yield large quantities of water, the bedrock formations of Boone County probably would not yield sufficient water for municipal or industrial use. The deeper bedrock formations, such as the Silurian and Ordovician limestones, probably would yield water of unsatisfactory chemical quality. These formations are used extensively in other parts of Indiana as a source of ground-water supply, but in Boone County the water from deep bedrock wells is highly mineralized.

The sand and gravel deposits of the glacial drift are the best aquifers within the county. The outwash deposits in the valleys of Sugar Creek and Eagle Creek are especially important, as they are relatively thick, course-grained deposits located close to a potential source of continuous recharge from the streams. They are fairly extensive along the valleys, and rather large supplies of water probably could be obtained from properly located wells. Other sand and gravel aquifers within the glacial drift have been discussed in this report and their locations are shown in plate 4. The most important of these at present are those that furnish relatively large supplies to municipal and industrial wells. It must be remembered, however, that good potential aquifers, not yet tapped by wells, may occur within the drift, particularly in areas where the conditions are not well known because most of the wells are relatively shallow or few wells have been drilled.

The records indicate that the sand and gravel deposits are generally more common and are thicker in areas underlain by bedrock valleys. Because of this and because the thickness of drift that might contain sand and gravel is greater, holes drilled over the bedrock valleys, shown on plate 3, have a better chance of obtaining a water supply than those drilled in areas of thin drift.

In the vicinity of Lebanon, areas that might prove suitable for the development of new wells for municipal and industrial use include an area within about 1,500 feet south and east of Noble and East Streets, where aquifers would probably be encountered at elevations of about 905-920, 880-890,[1/] 870-875, 825-830, 767, and 743 feet above sea level, and an area west of Lebanon in the central part of sec. 2, 3, 10, and 11, T. 18 N., R. 1 W., where sand and gravel would be encountered at elevations of about 905, 880, 860, 846, and 810 feet above sea level. In the Memorial Park area in Lebanon, the best aquifer probably would be at an elevation of about 890 feet above sea level. Other areas suitable for the development of large supplies of water may be revealed as additional wells in the Lebanon area are drilled and a more detailed knowledge of the local geology is thus obtained.

DEVELOPMENT OF NEW SUPPLIES AND CONSERVATION OF GROUND WATER

The information and maps of this report will serve as a guide to the location and development of new sources of ground-water supplies in Boone County. It should be remembered, however, that, because of the complexity of glacial deposition, the correlation of a particular aquifer over a broad area is often impossible.

In order to obtain additional information on the details of geology

1/ The elevations underlined indicate the best possibilities.

and ground-water conditions in Boone County, it is suggested that, in future drilling within the county, records should be made of the location of the drilling, a detailed description of the materials penetrated, and information on water levels, yields, drawdowns, and the quality of the water. Well drillers are requested to cooperate with the Division of Water Resources, Indiana Department of Conservation, Indianapolis, by submitting to that Division copies of well records of any new drilling, on the forms that will be provided by the State. These forms include spaces for information similar to that given in the well tables and will be provided free upon request. The purpose of the State in requesting that such information be filed is to provide a permanent record of detailed information on the occurrence of ground-water supplies throughout Indiana for the mutual benefit of well drillers, well owners, and the general public.

When the development of large supplies of ground water is planned, test drilling should be accompanied by pumping tests to determine the hydraulic characteristics of the water-bearing formations. From these data, the expected yields, interference effects, and spacing of wells can be estimated. Mechanical sieve analyses of the aquifer materials will assist greatly in the selection of a proper screen. Chemical and bacteriological analyses of the water obtained will be of value in the proper utilization of ground-water supplies.

One phase of well drilling that is often overlooked is the development of a new water well to remove the fine materials adjacent to the screen. Such development is usually done by intermittent pumping or by the use of a surge block which is moved up and down the well to force the water back and forth through the screen openings. In many wells the initial yield is materially increased by development. Most wells of moderate to large yield should be developed at a higher rate than that at which the well ordinarily

will be pumped, in order to minimize the continued pumping of fine sand and silt in the water. The use of screens and the proper development of small-diameter wells will postpone or eliminate difficulties due to "sanding up" or "riling up" of wells.

Permanent records of the drilling, construction, and yield of the well, including well logs and water-level and drawdown data, are extremely valuable for later comparison when supply problems occur, such as declining yield and changes in the quality of the water. New wells should be spaced as far apart as possible to minimize interference effects.

The increased use and importance of the ground-water supplies of Boone County require that this valuable resource be developed wisely. Large quantities of ground water are wasted by the uncontrolled discharge of flowing wells. The continued waste will result in a lowering of the ground-water level. However, caution should be used in changing the discharge from a flowing well. Several wells are reported to have been plugged by sand by changing the rate of flow too suddenly.

APPENDIX A

RECORDS OF WELLS IN BOONE COUNTY, INDIANA

Explanation of symbols used

Uses:

D - domestic, S - Stock, Irr - irrigation, Ind - industrial, PS - public supply, RR - railroad, AC - air conditioning, Aban - abandoned, ( ) - indicates former use.

Depth:

All depth figures other than those followed by m (indicating measured depths) are reported depths.
Depth figures enclosed in parentheses indicate former greater depth to which well was drilled.

Aquifers:

Aquifer data in parentheses are those of minor aquifers or deposits of sand and gravel that may be suitable as aquifers.
Aquifer data not in parentheses are those of the formation utilized by the well.

Water level:

Figure preceded by + indicates measurement of artesian head above the land surface.
Figure followed by + indicates the water level of a flowing well at or slightly above top of casing, so that the true piezometric surface is at a higher but unknown level.
Figure followed by ± indicates approximate depth below land surface.
Figures shown in tenths and hundredths of feet indicate measured water levels.
D indicates that the well was reported to have been drained by nearby ditching operations.

Drawdown:

In the rate and time column, the rate appears in left hand column and the time figure is listed in the right hand column.

Quality of water:

An A indicates that an analysis of water from the well appears in Appendix C.
B indicates that the water from the well was condemned for human use without treatment by the Indiana State Board of Health.

1 - Water is very hard.
2 - Water has high iron content.
3 - Water is sulfurous.
4 - Water is comparatively "soft".
5 - Water has oily scum on it.
6 - Salt water.

The note number or letter refers to the quality of the water of the formation tapped by the well in cases in which no parentheses occur.
The figure in parentheses following the note number is the depth, in feet, of the aquifer that contains the water to which the note number refers.

Temperature:

An asterisk (*) indicates that this is the temperature of water from a nearby spring.

Notes:

1. Log of this well appears in appendix B.
2. Vegetal matter in good state of preservation was penetrated.
3. Swamplike muck deposit containing vegetal matter was penetrated.
4. Gas issued from this well.
5. Quicksand or fine- to medium-grained sand common.
6. Yellow clay penetrated.
7. Boulder layer or zone reported.
8. Dry sands and/or gravels penetrated.
9. Bedrock is limestone (probably Devonian)
10. Bedrock is black shale (Devonian, New Albany Shale).
11. Bedrock is soapstone or "blue shale" (Mississippian).
12. Bedrock is sandstone (Mississippian).
13. Bedrock is limestone (Mississippian).
14. Bedrock is porous rock (Mississippian).
15. Bedrock is yellow limestone or yellow rock (Mississippian).
16. Bedrock is green shale (Mississippian).
17. Inadequate water supply when drilled.

An asterisk (*) preceding a number indicates the number reference in the bibliography from which this well datum was obtained.

Number in parentheses following note number is depth, in feet, of material indicated, unless this number in parentheses is followed by a T, in which case it indicates the thickness, in feet, of the material referred to.

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
B-Bo??-1	"At Lebanon"	-	-	-	935±	Gas test	1,600	-	-	-	-	210	-	-	-	-	-	-	-	-	1,*12 No gas
B-Bo??-2	"Lebanon, Ind. gas well"	-	-	-	940±	Gas well	450±	-	(26) (105)	(2) (8)	-	342	-	-	-	-	-	-	-	-	1,*10 *11
B-Bo??-3	"4½ miles NE. from Lebanon"	-	-	-	950±	do.	285	-	(26) (105)	(2) (8)	(Sand) (Gravel)	285	-	-	-	-	-	-	-	-	1,*10 *11
B-Bo??-4	"At Thorntown"	-	-	-	850	do.	1,287	-	-	-	-	65	-	-	-	-	-	-	-	-	1,*4
B-Bo??-5	"In Prairie Cr. Valley in Thorntown"	-	-	-	820±	do.	40+	-	40 ft. of drift is mainly sand, gravel			40	-	-	-	-	-	-	-	-	*11
B-Bo??-6	"On the uplands in south Thorntown"	-	-	-	850±	do.	75+	-	75 ft. of drift is mainly sand, gravel			75	-	-	-	-	-	-	-	-	*11
B-Bo??-7	"At Zionsville"	-	-	-	860±	do.	1,113	-	-	-	-	160	-	-	-	-	-	-	-	-	1,*12
B-Bo??-8	"In valley of Eagle Cr. at Zionsville"	-	-	-	825±	do.	165	-	(30)	(8)	(Gravel)	-	-	-	-	-	-	-	-	-	1,*11
Bo??-9	"In neighborhood of Big Springs"	-	-	-	935±	-	8 to 100	-	8 to 100	-	Gravel	-	10	About 1907	-	-	-	-	-	-	*7
Bo??-10	"In Dover"	-	-	-	900±	-	8 to 120	-	8 to 100	-	Sand, gravel, limestone	100	8	do.	-	-	-	-	-	-	13,*4
Bo??-11	"Short distance north of Lover"	Thomas McDaniel	-	-	895	-	22½	-	22	½	Gravel	-	-	-	-	-	-	-	-	-	1,*7
Bo??-12	"3 miles SE. of Elizaville, on Michigan Road	-	James A. Ball	-	956	-	84	-	(18) (41)	(3) (11)	Quicksand Finesand	-	-	-	-	-	-	-	-	-	1,*7
Bo??-13	"Hazelrigg"	-	-	-	916	-	11 to 96	-	11 to 96	-	Gravel	-	8	About 1907	-	-	-	-	-	-	*4
Bo??-14	"2 miles E. of Hazelrigg"	Otis Crane	-	-	925±	-	175	3	175	-	Probably gravel	-	6	do.	-	-	-	-	-	-	*4
Bo??-15	"2½ miles E. of Hazelrigg"	do.	-	-	922±	-	47	1½	47	-	Gravel	-	+2	-	-	-	-	-	-	-	*4
Bo??-16	"2½ miles N. of Jamestown"	Isaac Emerts	James A. Ball	-	955	-	236	-	(30)	(2)	(Quicksand)	76	-	-	-	-	-	-	-	-	1,*7
Bo??-17	"4 miles N. of Jamestown in Jackson Township"	John M. Shelly	-	-	940±	-	88	-	(12) (22) 62	(6) (6) 26	(Sand, gravel White sand Sand, gravel	-	-	-	-	-	-	-	-	-	1,*7
Bo??-18	"In Lebanon"	-	-	-	930 to 950	-	40 to 60 E 100 to 300 W	-	-	-	Gravel	-	-	-	-	-	-	-	-	-	*4
Bo??-19	"Washington St. well in Lebanon"	-	-	-	935±	-	108	-	(12) (19) 82	(4) (4) 1	(Sand) (Sand, gravel) Gravel	-	-	-	-	-	-	-	-	-	1,*7
Bo??-20	"5 miles W. of Lebanon"	Clairborne Cain	-	-	920±	-	243	-	(17) (73)	(5) (5)	(Quicksand) (Dry gravel)	-	-	-	-	-	-	-	-	-	1,17 *7

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
Bo?-21	"6 miles W. of Lebanon"	Seth W. Porter	-	-	910±	-	18	-	13	5	Sand	-	-	-	-	-	-	-	-	-	1,*7
Bo??-22	"6 miles S. of Lebanon"	Gar Vandeveer	James A. Ball	-	956	-	109	-	-	-	-	100	-	-	-	-	-	-	-	-	1,12,*7
Bo??-23	"Max"	-	-	-	930	-	10 to 125	-	-	10 to 70	Gravel and limestone	70	4 to 15	About 1907	-	-	-	-	-	-	13,*4
BoN?-24	"New Brunswick"	-	-	-	950±	-	11 to 150	-	6 to 150	-	Gravel	-	-	-	-	-	-	-	-	-	1,*4
Bo??-25	"Pike"	-	-	-	915	-	18 to 150	-	18 to 150	-	do.	-	16	About 1907	-	-	-	-	-	-	*4
BoG?-26	"Ratsburg"	J. M. Chambers	-	-	956±	-	18	-	17½	½+	Sand	-	-	-	-	-	-	-	-	-	*7
BoP?-27	"Royalton"	-	-	-	880 to 930	-	10 to 116	-	10 to 116	-	Gravel	-	7 to 15	About 1907	-	-	-	-	-	-	*4
BoP?-28	do.	Messrs. Foster and Leap	-	-	880 to 930	-	10 to 96	-	20½	5	do.	-	-	-	-	-	-	-	-	-	1,*7
BoP?-29	"In Fishback Valley in Royalton"	-	-	-	876	-	100±	-	25±	5	do.	-	-	-	-	-	-	-	-	-	1,*11
BoN?-30	"Slabtown"	George Dischman	-	-	960±	-	46½	-	32	½	do.	-	-	-	-	-	-	-	-	-	1,*7
Bo??-31	"At Thorntown"	Messrs. Walt and Klizer	James A. Ball	-	850±	-	333 or 343	-	(21) or (25)	(4) or (3)	(Quicksand) (Gravel)	150 or 137	-	-	-	-	-	-	-	-	1,*7
Bo??-32	"In Thorntown"	-	-	-	820 to 850	-	14 to 28	-	-	-	Sand and gravel	-	-	-	-	-	-	-	-	-	*10
G-Bo??-33	"East edge of Thorntown"	Samuel Jett	-	1887	818±	Gas test	1,700	8	90	-	Gravel	-	+12	About 1907	-	-	-	-	A	-	*4
Bo??-34	"1 mile W. of Thorntown"	William Mill	-	-	830±	-	108	-	(25)	(3)	(Quicksand)	-	-	-	-	-	-	-	-	-	1,*7
Bo??-35	"About 1½ miles W. of Thorntown"	Charles Moffitt	-	-	835±	-	44	-	(4)	(40)	(Dry gravel)	-	-	-	-	-	-	-	-	-	17,*7
Bo??-36	"3½ miles W. of Thorntown"	Robert Woody	-	-	820±	-	147	-	(18)	(55)	(Fine sand)	144	-	-	-	-	-	-	-	-	1,*7
BoP?-37	"1 mile S. of Thorntown"	Frank Harris	-	-	865±	-	132	-	(4) (126)	(23) (6+)	(Quicksand) (Cemented gravel)	-	-	-	-	-	-	-	-	-	1,*7
BoA?-38	"3 miles N. of Thorntown"	S. Dukes	James A. Ball	-	830±	-	185	-	(18)	(12)	(Quicksand)	183½	-	-	-	-	-	-	-	-	1,*7
BoA?-39	do.	Al Weatherald	do.	-	830±	-	187	2	(18) 120	(12) ?	do. Clay	183½	10	About 1907	-	-	-	-	-	-	1,*7
BoN?-40	"3 miles NE of Thorntown"	John Leatherman	-	About 1905	845±	-	140	4	140	?	Sand	-	+4	About 1907	-	-	-	-	-	50 1907	*4

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoB?-41	"3½ miles NE. of Thorntown"	J. E. Leatherman	-	-	845±	-	140	4	140	?	Gravel	-	+7	-	-	-	-	-	-	-	*4
BoB?-42	"3 miles E. of Thorntown near Union Church"	-	-	-	880±	-	111	-	(27)	(9)	(Quicksand)	-	-	-	-	-	-	-	-	-	1,*7
BoC?-43	"1 mile N. of Whitelick"	Willis Johnston	-	-	960±	-	60	2	60	-	-	-	+5	-	30	About 1907	-	-	-	-	*4
BoD?-44	"Whitestown"	Isaac Isenhour	-	-	935±	-	105	4	105	-	Gravel	-	9	About 1907	-	-	-	-	A	-	*4
BoD?-45	"At Zionsville"	-	-	-	830 to 890	-	37+ to 65	-	16 to 22	1 to 3	do	-	-	-	-	-	-	-	-	-	1,*7
BoD?-46	"Zionsville"	Jas. W. Brendel	-	-	830 to 890	-	108	3	108	-	do	-	3	About 1907	-	-	-	-	A	-	*4
BoE2-47	"2½ miles NW. of Zionsville"	A. Perry Moore	-	-	940±	-	81	2½	78	-	Gravel and sand	-	+6	do	1	About 1907	-	-	-	54 1907	*4
BoA?-48	"In vicinity of Sugar Creek, near west boundary of county"	-	-	-	815±	-	-	-	-	-	-	20 to 40	-	-	-	-	-	-	-	-	13,*10
BoG?-49	"E. of Lebanon"	-	Flem D. Boyd	-	940 to 960	-	120 to 160	-	110+ to 150±	10±	Gravel	-	-	-	-	-	-	-	-	-	4
BoA14-1	SW¼SE¼	Lester Skean	Noble Higer	Fall of 1946	834	D,S	52	2	50±	2+	Sand	-	7±	Fall 1946	-	-	-	-	-	-	-
BoA15-1	SE¼SE¼	Lawrence White	John Armstrong	About 1902	844	D,S	107 or 111	4	-	-	-	-	11 or 7	About 1945	-	-	-	-	-	-	-
BoA17-1	N½SW¼	Frank Powers	Abe Winks and Noble Higer	1936 or 1937	840	D,S	630	6	196 (70) (190)	434	Blue shale and limestone (Gravel and sand) (Sand and gravel)	196	100	1936 or 1937	150 to 200	1936 or 1937	-	-	-	-	11
BoA19-1	NW¼NE¼	Marvin Larsh	Cory	1926	825	D,S	90	-	-	-	-	-	2±	About 1945	-	-	-	-	-	-	-
BoA21-1	NE¼NW¼	Kirt Holloway	do	-	849	D,S	64±	4	-	-	-	-	11	About 1945	-	-	-	-	-	-	-
BoA22-1	SW¼SE¼	Big Four Railroad	Noble Higer	About 1927	817	RR	56	2	53	3	Gravel	-	+	About 1927	17	-	-	-	-	-	-
BoA22-2	NE¼NE¼	Lawrence White	-	Long before 1947	838	S	65m	4	-	-	Probably gravel	-	+2.13	June 19 1947	60 to 70	June 19 1947	4.9+	6± +	-	52½ June 1947	-
BoA26-1	SE¼SW¼	Big Four Railroad	Noble Higer	About 1927	820±	RR	140	2	-	-	Gravel	-	16	About 1927	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoA30-1	NE¼SW¼	Noble Higer	Noble Higer	1946	794	D	56	2	21	35±	"Limestone"	21	+2 3	1946 January 1947	-	-	-	-	-	-	11,13
BoA30-2	SW¼NE¼	Nathan Coyle	do.	1946	812	D	101	2	100	1+	do.	100	1.34	June 20, 1947	-	-	-	-	-	52½ Jan. 1947	-
BoA31-1	SE¼NW¼	Harley Etter	Claude Kersey	About 1937	815	D,S	81	3	10±	71+	"Very hard limestone"	10±	6	About 1937	-	-	-	-	-	*53 1/47	-
BoA31-2-1	SE¼NE¼	Charles Boyer	John Armstrong	-	824	D,S	60±	4	-	-	"Limestone"	-	9±	About 1946	-	-	-	-	-	-	-
BoA31-2-2	SE¼NE¼	do.	Higer	-	820	S	40	2	20	-	do.	-	-	-	Good well	Up to present	-	-	-	-	-
BoA31-2-3	SE¼NE¼	do.	do.	-	820	S	40	2	20	-	do.	-	-	-	Well not good	Up to present	-	-	-	-	-
BoA31-2-4	NW¼SE¼	do.	John Armstrong	-	825	S	60±	4	-	-	-	-	13±	About 1946	-	-	-	-	-	-	-
BoA31-3-1	NE¼SE¼	Ed Grau	-	-	824	S	15m	24	-	-	-	-	12.00	Nov. 7, 1947	-	-	-	-	-	-	-
BoA31-3-2	NE¼SE¼	do.	John Armstrong	-	824	D,S	37½m	4	-	-	Limestone or gravel	-	7.59	June 19, 1947	-	-	1±	- 2½	-	-	-
BoA34-1	SW¼SW¼	Sugar Plain Church	Noble Higer (?)	About 1937	826	D	120	-	95	25	Gravel	-	30	About 1937	-	-	-	-	-	-	-
BoA34-2	SW¼SW¼	Herb Sussing	Claude Kersey	About 1945	831	D,S	165	-	-	-	do.	-	-	-	-	-	-	-	-	-	-
BoA35-1-1	110± N. Pearl St., Thorntown	Thorntown Municipal Water Plant	James Kersey	About 1910	851	(PS) Aban	97	8	90±	-	Probably gravel	-	-	-	200	About 1910	-	-	1	-	-
BoA35-1-2	do.	do.	do.	do.	851	(PS) Aban	103 or 113	8	90±	-	do.	-	-	-	200	About 1910	-	-	1	-	-
BoA35-1-3	do.	do.	do.	do.	851	(PS) Aban	110	8	90±	-	do.	-	-	-	200	About 1910	-	-	1	-	-
BoA35-1-4	do.	do.	do.	do.	851	PS test	765 or 960	12 to 6	500	200	Limestone	200	-	-	-	-	-	-	6	-	1,17
BoA35-1-5	NE¼SE¼, 650± ft. E. of Front and Church St., Thorntown	do.	-	1928	818	PS	70	8	-	-	Gravel	-	+	1928 and 1947	-	-	-	-	A	-	-
BoA35-1-6	do.	do.	-	do.	818	PS	70	8	-	-	do.	-	+	do.	-	-	-	-	A	-	-
BoA35-2	NW corner Pearl and Plum Sts., Thorntown	Thorntown Dairy Products	Holt Bros.	Jan. 1947	853	D,Ind	88	8	78	10	Gravel and sand	-	40	Jan. 1947	100	Jan. 1947	40	100 f	-	-	1
BoA35-3	120 W. Church St., Thorntown	Robert Coolman	Henderson	1898	853	Aban	110	2½	-	-	Probably gravel	-	+ 50	1898 1940	- -	-	-	-	-	-	-

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoA35-4	222± N. Front St., Thorntown	Brockmeyer	Edward Applegate	-	818	-	65?	6	-	-	Probably gravel	-	8.3+	June 20, 1947	50 est	June 20, 1947	-	-	-	-	-
BoA36-1	SE¼NW¼	John McKinsey	Clyde Kersey	1946	840	D,S	82	3	74	8	Gravel	-	7	1946	-	-	-	-	-	-	-
BoB13-1-1	SW¼SW¼	Gustin Bluebaugh	A. R Kelly	About 1945	883	D,S	190	4	185	5+	do.	-	15	About 1945	10	About 1945	5	10 -	-	-	-
BoB13-1-2	NW¼SW¼	do.	do.	About 1940	883	D,S	52	4	-	-	do.	-	11	About 1943	-	-	-	-	-	-	-
BoB19-1	SW¼NW¼	W. and A. McKern	Noble Higer	About 1927	843	D,S	144	2	(70) 140	(10) 4	(Gravel) Gravel	-	+9	About 1927	16.7	About 1927	-	-	5(70)		4(70, 100)
BoB19-2	SE¼SE¼	Clarence Reagan	do.	About 1930	855	D,S	153±	2	-	-	-	-	0	About 1930	-	-	-	-	-	-	2(151)
BoB20-1	SW¼SW¼	Lloyd Bennington	James and Clyde Kersey	Sept. 1936	855	D,S	145	3 or 4	125	20	Gravel	-	+	1947	-	-	-	-	-	-	-
BoB20-2	NE¼SW¼	Glenn Bratton	-	-	875	S	139	4	-	-	Probably gravel	-	20.74	June 16, 1947	Not a good well	Up to present	-	-	-	-	-
BoB23-1	NW¼NE¼	S. C. Allen	-	About 1907	887	D,S	56	1¼	41	15	do.	-	15 31±	1907 1947	-	-	-	-	-	-	-
BoB24-1	SW¼NW¼	H. E. Whiffing	A. R. Kelly	1944	888	D	235	4	230	5	Yellow gravel	-	20	1944	6	1944	5	- 6	-	-	-
BoB24-2	SW¼SW¼	Ralph Higgins	Willard English	About 1945	885	D	27	3 or 4	-	-	Gravel	-	18	About 1945	-	-	-	-	-	-	-
BoB24-3	SW¼NW¼	State of Indiana	do.	do.	877	D	158	4	155	3	do.	-	28	do.	-	-	-	-	-	-	2(188)
BoB24-4-1	NW¼NW¼	Gustin Bluebaugh	A R. Kelly	do.	882	D,S	48	4	-	-	Probably gravel	-	11	do	-	-	-	-	-	-	-
BoB24-4-2	NW¼NW¼	do.	Noble Higer	About 1935	881	S	50	2	-	-	Sand and gravel	-	9.85	About 1935	-	-	-	-	-	-	-
BoB25-1	NW¼NW¼	Ralph Higgins	Willard English	About 1945	891	D,S	74	4	72	2	Gravel	-	30	About 1945	-	-	-	-	-	-	-
BoB28-1	SE¼SW¼	H. E. Whiffing	A. R. Kelly	About 1943	880	D,S	184±	4±	-	-	do.	-	20	About 1943	-	-	-	-	-	-	5
BoB29-1-1	SW¼NW¼	Lloyd Bennington	James Kersey	Dec. 1936	826	D,S	124	3	-	15?	do.	-	+15+	July 31, 1947	275± est.	July 31, 1947	-	-	-	52½ June 1947	-
BoB29-1-2	NW¼SW¼	do.	do.	July 1940	840	-	136	3	121?	15?	do.	-	+	do	-	-	-	-	-	-	-
BoB30-1	NE¼SE¼	Alfred Warren	Ray Lister	1947	834	D,S	110	4	-	-	do.	-	+0.25+	Apr.11, 1947	-	-	-	-	-	-	-
BoB30-2	NE¼NW¼	Charles Graham	Noble Higer	About 1935	851	D,S	149	2	145	4±	do.	-	+	-	3.3 est	About 1935	-	-	-	-	4(80)
BoB30-3	NE¼NE¼	William Endres	Cory	-	841	D,S	140	2	-	-	Probably gravel	-	+1.8+	June 16, 1947	1.5	June 16, 1947	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m. per foot) and time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoB32-1	NW¼SE¼	Mrs. Ward Moore	Ray Lister	April 1947	879	D,S	215	4	205	10+	Gravel	-	19	April 1947	-	-	-	-	-	-	-
BoB35-1	SE¼SW¼	H. E. Whiffing	A. R. Kelly	About 1944	910	D,S	230	4	218	12	Fine gravel and sand (gravel)	320	45	About 1944	-	-	-	-	5-320	-	4(218)
									(318)	(2)	Bedrock										
									(320)	-											
BoC20-1	SE¼NE¼	Cecil Rogers	Blaine Rader	About 1943	907	D,S	96±	-	-	-	Gravel	-	16±	About 1943	-	-	-	-	-	-	5
BoC22-1	SE¼NE¼	Willis DeFord	do.	About 1945	914	D,S	40m	3	-	-	Probably gravel	-	-	-	-	-	-	-	-	-	-
BoC23-1	SW¼SW¼	Orval Wood	-	-	913	D,S	96	-	-	-	do.	-	-	-	-	-	-	-	-	-	-
BoC30-1	NW¼SE¼	Kennath Nance	-	"Long ago"	902	D,S	39 27m	1½	-	-	do.	-	7.26	June 25 1947	-	-	-	-	-	-	-
BoC32-1	SE¼NE¼	Wendall Morton	A. R. Kelly	About 1943	919	D,S	35	4?	-	-	Gravel	-	8±	About 1943	-	-	-	-	-	-	-
BoC33-1-1	SW¼SE¼	Morton Bros.	do.	do.	930	D,S	80	4	60	20	Sand and gravel	-	5	do.	-	-	3	6 ?	-	-	1
BoC33-1-2	NW¼SW¼	do.	do.	do.	927	D,S	140	4	138	2	Gravel	-	40	do.	-	-	-	-	-	-	6 7(130 to 140)
BoC35-1	SW¼SE¼	Herman Warner	-	-	941	D,S	188	4	-	-	Probably gravel	-	-	-	-	-	-	-	-	-	-
BoC36-1	NW¼NE¼	Emma Sample	A R Kelly	About 1945	934	D,S	256	4	250	6	Gray gravel	-	-	-	-	-	5	6 ?	-	-	-
BoD18-1	NW¼SW¼	Merris Green	Blaine Rader	1946	924	D,S	55	-	-	-	Gravel	-	6	1946	-	-	-	-	-	-	-
BoD20-1-1	SE¼NW¼	Bertha Bowers	do.	Before 1925	940	D	96	2	-	-	do.	-	19	About 1945	-	-	-	-	-	-	-
BoD20-1-2	SE¼NW¼	do.	do.	do.	938	S	140	-	-	-	-	-	40 to 60	do.	-	-	-	-	-	-	-
BoD23-1	NW¼SW¼	V. R. Goodman	Jess Goodnight	Spring 1946	942	D	85	2	-	-	-	-	3½	Spring 1946	-	-	-	-	-	-	-
BoD23-2	NW¼SW¼	R. K. Childers	Jess and H(?) Agard	"Long ago"	938	D	35±	-	33±	2±	Sand and gravel	-	7±	1947	-	-	-	-	-	-	-
BoD23-3	NW¼SW¼	H(?) Agard	H(?) Agard	do	938	D	14	185?	9	5	Gravel	-	-	-	-	-	-	-	-	-	-
BoE1-1-1	SE¼SW¼	The Swine Breeder Pure Serum Co.	-	About 1910	848	D,S Ind	165±	6	-	-	Gravel and sand	-	+1 or+2	1910±	-	-	-	-	2	-	5
BoE1-1-2	SE¼SW¼	do.	Noble Higer	About 1930	848	D,S Ind	167	6	(40) 159	(10) 8	Sand, gravel Gravel	-	+1 or+2	About 1930	500	About 1930	-	-	2	-	-
BoE4-1-1	NE¼SW¼	Earl Rahm	Claude Kersey	About 1944	833	D,S	52	4	49	2	Gray gravel	-	7± or 13	About 1944	-	-	-	-	-	-	-

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m. per ft.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoE4-1-2	NW¼SE¼	Earl Rahm	Claude Kersey	1947	841	Not yet in use (D,S)	122m	4	(30)	(3)	Gravel	-	32.89	June 18, 1947	-	-	-	-	-	-	-
BoE8-1	NW¼SW¼	Dwight B. Kendall	Sutton	-	853	D,S	60±	4	-	-	Gravel ?	-	-	-	-	-	-	-	1	-	-
BoE11-1-1	W½W½	Lloyd Bennington	Clyde Kersey	April 1947	877	None	185	4	-	-	None	180	Dry	-	-		-	-	-	-	22,10
BoE11-1-2	W½W½	do.	do.	May 1947	876	Not yet in use (D,S)	140 107m	4	-	-	-	-	20.59	June 18, 1947	-	-	19	-	-	-	-
BoE12-1-1	NW¼NE¼	Robert Simms	-	-	860	(S) Aban	22m	24	-	-	-	-	4.07	June 20, 1947	-	-	-	-	-	-	-
BoE12-1-2	NW¼NE¼	do.	-	About 1920	856	S	180m	2	-	-	Probably gravel	-	+ 5.69	About 1920 June 20, 1947	-	-	-	-	-	-	2(180)
BoE16-1-1	NE¼SE¼	W. E. Swisher	Ed Kirk	About 1923	893	D,S	110	4	-	-	"Limestone"	-	18±	About 1945	-	-	-	-	-	-	-
BoE16-1-2	NE¼SE¼	do.	"	-	893	(D) Aban	65	2	-	-	Probably sand and gravel	-	-	- -	-	-	-	-	-	-	-
BoE19-1-1	NE¼NE¼	Harold Cox	Armstrong and Sutton	About 1907	876	D	52	4	-	-	Gravel	-	18±	About 1945	-	-	-	-	-	-	-
BoE19-1-2	NE¼NE¼	do.	do.	do.	876	S	60	4	-	-	do.	-	18±	do.	-	-	-	-	-	-	-
BoE19-1-3	NE¼NE¼	do.	-	Before 1907	872	(D) Aban	47m	4	-	-	Probably gravel	-	19.20	June 20, 1947	-	-	-	-	-	-	-
BoE23-1-1	SW¼SW¼	William Gillan	-	About 1910	898	D	38	2	-	-	Sand and gravel	-	10	1947	-	-	-	-	-	-	-
BoE23-1-2	SW¼NW¼	do.	-	do.	896	S	38	2	-	-	do.	-	8	do.	-	-	-	-	-	51-3/4 June 1947	
BoE23-1-3	NE¼NW¼	do.	Noble Higer	About 1945	895±	S	26	2	-	-	Gray gravel	-	3 to 4	1945	-	-	-	-	-	-	-
BoE25-1	SE¼SE¼	Orville Taylor	Newt Kersey	About 1907	918	D,S	75 or 80	2 or 3	-	-	Sand and gravel	-	18±?	About 1945	-	-	-	-	-	-	-
BoE29-1	SE¼SE¼	A. T. Galloway	-	1936	890	D,S	125	4	-	55	"Blue limestone"	-	16	1947	-	-	-	-	-	-	13
BoE31-1	SW¼SW¼	Mrs. LaFollette	-	Before 1907	858	S	60 57m	4	30	30±	do.	30	+7 +9.7	1907 June 20, 1947	16.7	About 1945	-	-	-	51-1907 52-June 1947	*4
BoE32-1	NW¼NE¼	-	-	-	873	Aban	21	4	-	-	Probably gravel	-	9.57	July 23, 1947	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m. per sq. ft. and time unit)	Quality of water	Water temperature (°F)	Notes
BoE34-1	NE¼NE¼	Charles Routh	-	About 1910±	900	D,S	50	2	(10)	-	Gravel	-	6	About 1945	-	-	-	-	-	-	-
BoE36-1-1	NW¼NE¼	Ira Shockley	-	About 1907	915	(D,S) Aban	110	2	-	-	"Sand"	-	8.12	June 18, 1947	-	-	-	-	-	-	-
BoE36-1-2	NW¼NE¼	do.	Ray Lister	June 1947	915	D,S	230	4	(120) (135) (190) 192	- - 2 38	(Sand) (Sand, gravel) (Limestone) (Blue shale)	190	-	-	-	-	-	-	-	53 June 1947	13
BoF5-1	NE¼NW¼NW¼	Benny Cook	do.	April 1946	880	D	187	4	185±	2±	Gravel	-	18	April 1946	-	-	-	-	-	-	-
BoF5-2-1	NW¼NW¼	Claude Potts	Harold Lister	1943	895	-	175±	4	None	-	-	-	-	-	-	-	-	-	-	-	4,17
BoF5-2-2	NW¼NW¼	do.	do.	1945	895	D,S	165 or 132	-	-	-	-	-	8± or 16±	About 1945	-	-	-	-	-	-	-
BoF8-1	NE¼	do.	do.	-	909	S	80±	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoF9-1-1	Near center S½SE¼	Rachel Coons Runyon	?	-	928	Aban	40±m	4	-	-	-	-	7.53	Apr. 9, 1947	-	-	-	-	-	-	-
BoF9-1-2	Near center S½SE¼	do.	James Kersey	-	926	D,S	185	3	-	-	-	-	-	-	Good well	-	-	-	-	-	-
BoF9-2-1	SW¼SE¼	Virgil Smith	Clyde Kersey	About 1944	926	-	350	4	None	-	-	250	Dry hole	-	-	-	-	-	-	-	11-(100T) 17
BoF9-2-2	SW¼SE¼	do.	do	do.	930	-	224	-	None	-	-	224	do.	-	-	-	-	-	-	-	4,17
BoF9-2-3	SW¼SE¼	do.	Flem Boyd	1944 or 1945	930	-	87	-	-	-	Sand and clay	-	-	-	-	-	-	-	-	-	17
BoF9-2-4	SW¼SE¼	do	do.	do.	928	-	200	-	None	-	-	200	Dry hole	-	-	-	-	-	-	-	11,17
BoF9-2-5	SW¼SE¼	do.	Harold Lister	-	928	-	100	-	None	-	-	-	-	-	-	-	-	-	-	-	17
BoF9-2-6	SW¼SE¼	do.	James Kersey	-	915±	Aban Capped	100±	-	-	-	Probably gravel	-	+	-	-	-	-	-	-	-	-
BoF11-1	NE¼	James Lewallen	Flem Boyd	-	919	-	45	-	-	-	Sand and gravel	-	15±D	-	-	-	-	-	-	-	-
BoF12-1	W½SE¼	Dr. H.E. Whiffing	?	-	931	D,S	125 or 150	4	123± or 148±	-	-	-	-	-	-	-	-	-	1	-	4
BoF13-1	"2 mi. N. of Lebanon on Frankfort Road"	D. M. Burns	-	-	940±	-	112	-	9 33	2 2	Gravel, sand Gravel ?	-	-	-	-	-	-	-	-	-	1,W7
BoF13-2	SW¼SE¼	Kern	Claude Kersey	1945	937	D,S	100	4	98	2	Gravel	-	18±	1945	"Good well"	1945	-	-	-	-	-

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BoF13-3-1	SW¼SW¼SE¼	Wm and Buren Crane	Ray Lister	Sept. 1946	937	-	100	4	-	-	"Sand and mud"	-	-	-	-	-	-	-	-	-	17
BoF13-3-2	SW¼SW¼SE¼	do.	do.	do.	937	-	180	4	(80)	-	(Probably sand and gravel)	-	-	-	-	-	-	-	-	-	17
BoF13-3-3	SW¼SW¼SW¼	do	do.	do.	937	S	80	4	-	-	Gravel	-	18±	Sept. 1946	-	-	-	-	-	-	-
BoF14-1	NE¼NW¼	Jeddie Couger	Willard English	About 1945	931	D,S	50	4	47	3	Black gravel	-	18±	About 1945	-	-	-	-	-	-	1
BoF18-1	NW¼NE¼	Dr. Ernest Kline	do	Fall 1945	899	D,S	105	4	103	2	Gravel	-	30	Fall 1945	-	-	-	-	-	-	1
BoF18-2	NE¼NW¼	Shannon	Claude Kersey	About 1945	897	D,S	105	4	101	4	do.	-	-	-	-	-	-	-	-	-	-
BoF19-1	NW¼NE¼	Big Four Railroad	Noble Higer	About 1927	917	(D,RR) Aban	60	2	-	-	do.	-	16±	About 1927	-	-	-	-	-	-	-
BoF19-2	NE¼NE¼	Walter Green	Rollie Higer	1945	915	D	85	4	-	-	do.	-	13	1945	-	-	-	-	-	-	-
BoF20-1	W½W½NW¼NW¼	Hazelrigg Telephone Co.	Frank Stewart	1896	915	D	74	2	-	-	do.	-	15	April 1947	-	-	-	-	-	-	-
BoF20-2	NW tip NW¼NW¼	Joe Schaffer	Powers and Son	About 1940	915	Aban	40	2	38±	2± (23+)	Sand (Sand)	-	1.20	Apr. 11 1947	-	-	-	-	-	-	17
BoF21-1-1	SW¼NE¼	Sam Miller	Jess Kersey	1914	929	D,S	40	4	-	-	Gravel	-	12	-	"Good well"	Up to present	-	-	-	-	-
BoF21-1-2	SW¼NE¼	do.	-	1917	923	Aban Plugged	175	4	-	-	-	175±	-	-	-	-	-	-	-	-	17
BoF21-1-3	SW¼NE¼	do.	Hobbs	1937	923	D,S	62±	4	-	-	Gravel	-	3.05	Apr. 11, 1947	"Good well"	Up to present	-	-	-	-	-
BoF21-1-4	SW¼NE¼	do.	-	-	922	Aban	23½±	4 to 2	-	-	-	-	+ 1.36	do. Nov. 6, 1947	-	-	-	-	-	-	-
BoF21-1-5	SW¼NE¼	Sam Miller	James Kersey	-	922	S	30	3	-	-	-	-	+	About 1947	-	-	-	-	-	-	-
BoF22-1-1	SE¼NW¼	do.	Kersey	-	925	Aban	50	4?	-	-	Gravel	-	+D	1930	-	-	-	-	-	-	-
BoF22-1-2	SE¼NW¼	do.	Jess Kersey	-	925	D,S	55	4?	51½	7½	do.	-	2 to 3	About 1946	-	-	-	-	-	-	-
BoF23-1-1	NW¼SW¼	Earl G. Henry	-	-	927	D,S	35	2½+	-	-	Probably gravel	-	16±	1947	-	-	-	-	-	-	-
BoF23-1-2	NW¼SW¼	do.	-	-	927	S	60	2½±	-	-	-	-	12±	About 1947	-	-	-	-	-	-	-
BoF23-2-1	Near center N½SW¼	Clifford Daugherty	C. Kersey	-	928	D,S	80	2½	77+	3±	Gravel	-	-	-	"Weak well"	Up to present	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoF23-2-2	SE¼NW¼SW¼	Clifford Daugherty	-	-	934	Aban	18m	24 to 30	-	-	-	-	2.86	Apr. 11, 1947	-	-	-	-	-	-	-
BoF23-2-3	SE¼NW¼SW¼	do.	C. Kersey	-	934	Aban	78m	4	75±	3±	Gravel	-	12.96	do.	Poor well	Up to present	-	-	-	-	-
BoF23-3-1	Near center SE¼NE¼	Earl Wynkoop	- -	-	917	D,S Aban	25±	36±	-	-	Probably gravel	-	12±	About 1946	-	-	-	-	-	-	-
BoF23-3-2	SE¼NE¼	do.	Clyde (?) Kersey	-	917	-	175	4	-	-	None	175	Dry		-	-	-	-	-	-	16,17
BoF23-3-3	E½SE¼NE¼	do.	-	About 1923	922	D,S	100±	4	-	-	-	-	20 to 25	About 1946	-	-	-	-	-	-	-
BoF23-4	E½NE¼SE¼	Frank Nelson	Noble Higer	About 1942	919	D,S	54	2	-	-	Gravel	-	15	About 1942	-	-	-	-	-	-	-
BoF23-5-1	SW¼NE¼	Charles Nelson	Willard English	1947	927	-	200	4	-	-	None	185	Dry	-	-	-	-	-	-	-	-
BoF23-5-2	SW¼NE¼	do.	do.	1947	930	D	57	4	-	-	Gravel	-	15.20	1947	-	-	-	-	-	-	-
BoF24-1	NW corner NW¼NW¼	R. A. Pollard	-	"Long ago"	935	D,S	113	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoF24-2	SW¼SW¼	S. O. Nelson	Earl Merritt	About 1945	920	D,S	40	-	37	5±	Gravel	-	6	About 1945	-	-	-	-	-	-	-
BoF24-3-1	NE corner NE¼NW¼	Joseph Bowles	Willard English	Jan. 1946	931	-	230	4	-	-	"None"	109	18.30	Apr. 9, 1947	-	-	-	-	-	-	1,17
BoF24-3-2	NE corner NE¼NW¼	do.	do.	do	934	D	84	4	82	2	Gravel	-	16.60	Apr. 9, 1947	-	-	-	-	-	-	1
BoF24-4	NW corner NW¼NE¼	M. L. Fruits	-	-	940	D	25±	36±	-	-	Probably gravel	-	4± 19±	Winter, spring Summer, autumn	-	-	-	-	-	-	-
BoF24-5	Near center N½NW¼NE¼	Clint Perkins	Willard English	Jan. 1946	937	D,S	43	4	41	2	Gravel	-	18	Jan. 1946	-	-	-	-	-	-	6(41T)
BoF24-6	SW¼NE¼	Omer Dale	Claude Kersey	About 1945	937	D,S	123	-	118	5	Gray limestone	118	18	About 1945	-	-	-	-	-	-	-
BoF24-7-1	NW¼NW¼SE¼	Dr. Donald A. Laird	-	-	930±	Irr	21m	60 to 72	-	-	Probably gravel	-	2.62	Apr. 9, 1947	-	-	-	-	-	-	-
BoF24-7-2	NW¼NW¼SE¼	do.	Rollie and Noble Higer	1930 or 1935	940±	D	42±	2	40	2±	Gravel	100	18±	1930 or 1935	-	-	-	-	-	-	11-M (122T)
BoF24-8-1	SE¼NW¼	Al Akers	-	-	935	S	109	-	-	-	-	-	0.62	Apr. 9, 1947	-	-	-	-	-	-	-
BoF24-8-2	S½NW¼	do.	-	-	928	S	20m	1¼	11	7	Gravel	-	4.79	do.	-	-	-	-	-	-	-
BoF24-9	SW¼SE¼	Joseph Trowbridge	-	-	937	D,Irr	25	4	-	-	do.	-	10	1945	-	-	-	-	2	-	-

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoF24-10-1	NW¼SE¼	William Maudlin	Claude (?) Kersey	1946	948	D	203	4	(135+) (155±) (180+)	– – –	(Sand, gravel) do. do.	195	–	–	–	–	–	–	–	–	17
BoF24-10-2	NW¼SE¼	do.	Clayton W. Rayburn	1946	948	D	36	4	–	–	Gravel	–	12	1946	–	–	–	–	–	–	–
BoF24-11	NW¼NW¼NE¼	James Gowris	Claude Kersey	Summer 1945	940	D	112	4	–	–	do.	–	2.4	Summer 1945	10	Summer 1945	–	–	–	–	–
BoF25-1	E½NE¼SE¼	Lebanon	–	Long ago	934	(PS) Aban	20m	5	–	–	Probably gravel	–	8.07	Apr. 10, 1947	–	–	–	–	–	–	–
BoF25-2	NW corner Esplanade and Coulson Sts., Lebanon	Albert Kramer	Flem Boyd	–	930	D,Irr	96	3	(45) 90	(5) 6	(Sugar sand) Gravel	–	18	1940 or 1945	–	–	–	–	–	–	–
BoF25-3	Lafayette Ave, Lebanon	Jennie Cassidy	–	–	932	D	85	3	–	–	–	–	–	–	–	–	–	–	B	–	–
BoF25-4	NW tip NW¼SW¼	Fred Jaques	Omer Kersey	1911	924	D,S	85	–	–	–	–	–	–	–	–	–	–	–	–	–	–
BoF25-5	N½SW¼NW¼	Fern Shelburne	Newt and Jess Kersey	1908	922	D,S	118	3	–	–	Probably sand and gravel	–	28+	About 1940	–	–	–	–	–	–	–
BoF25-6	Center E½W½SW¼	Pleasant Shoemaker	–	–	932	S	12.3m	36±	–	–	do.	–	3.90	Feb. 14, 1947	–	–	–	–	–	–	–
BoF25-7	NW¼SW¼	Gus Chambers	Claude Kersey	1944	932	D,S	105	3	(58) 100±	(2±) 5±	(Quicksand) Gravel	–	15	1944	–	–	–	–	–	–	–
BoF25-8-1	720 W. Camp St., Lebanon	R. Adney	–	Long ago	929	S	28½ 12m	1¼ 30	–	–	Probably gravel	–	2.17	Apr. 2, 1947	–	–	–	–	–	–	–
BoF25-8-2	do.	do.	Edwin Walls	1925	929	D Little used	100±	4	–	–	–	–	10±	About 1945	–	–	–	–	–	–	–
BoF25-9	740 W. Camp St., Lebanon	Claude Potts	Kersey	About 1943	929	S	18	1¼	–	–	Gravel	–	–	–	–	–	–	–	–	–	–
BoF25-10	1018 N. Lebanon St., Lebanon	Mrs. S. T. Willmoyte	–	Long ago	938	Aban	100	1½	–	–	–	–	–	–	"Was good well"	Long ago	–	–	–	–	–
BoF25-11	SE¼NE¼	Frank Rader	Willard English	1946	933	D,S	42	4	39½	2½	Black gravel	–	10±	1946	–	–	–	–	–	–	6(39½T)
BoF25-12	SE¼NE¼	Louis Learkamp	–	About 1942	933	D,S	65	4	–	–	–	–	–	–	–	–	–	–	–	–	–
BoF25-13	800± Lafayette Ave., Lebanon	Roy Worrell	Kersey ?	About 1923	932	Aban	84m	4	–	–	–	–	28.48	Apr. 14, 1947	–	–	–	–	–	–	–
BoF26-1	SE tip NW¼SE¼	Ralph Roams	Kersey	–	942	D,S	80	4	–	–	–	–	18±	About 1945	–	–	–	–	–	–	–
BoF26-2-1	SE¼NE¼	Nolan Lee Endicott	James Kersey	1887	941	D,S	100±	2	–	–	Gravel	–	–	–	–	–	–	–	–	–	–

Records of wells in Boone County, Indiana—Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoF26-2-2	SE¼NE¼	Nolan Lee Endicott	Claude Kersey	June 1945	937	D,S	230	4	(115) (123) (216)	(5) (5) (6)	(Gravel) do. do.	222	-	-	-	-	-	-	-	-	1,4,11, 17
BoF26-2-3	SE tip NW¼SE¼	do.	Kenneth Chatham	April 1947	939	Aban	184	4	(92) (123) 180	(2±) (½) 4	(Mud, sand) (Sand) Gravel and sand	-	24	April 1947	-	-	-	-	-	-	4,17
BoF27-1	SW¼SE¼	Anna Richman	-	-	942	D,S	185	4	-	-	Probably sand and gravel	-	207	About 1945	-	-	-	-	-	-	Pumps little sand
BoF27-2	SE¼SW¼	Mrs. S. T. Reynolds	Kersey	-	942	S	29m	4	-	-	do.	-	4.2	Mar. 6, 1947	-	-	-	-	-	-	17
BoF27-3	N½NE¼NW¼	Sam Miller	-	-	935±	S	30 20m	40±	29	1	Gravel	-	10.17	Apr. 14, 1947	-	-	"0"	1,000 g.p.d.	-	-	-
BoF28-1-1	SW¼SE¼	Gertrude Utter	Flem Boyd	Long ago	941	D,S	(150) 48	3	43+ (150)	5+	Sand, gravel (Sand, gravel)	200	0 to 3±	About 1945	-	-	-	-	-	-	11
BoF28-1-2	SW¼SE¼	do.	Willard English	Summer 1946	941	Aban	230	4	-	-	-	130	-	-	-	-	-	-	-	-	11,17
BoF28-2	E½SW¼SW¼	Ralph C. Goodwin	Ed Wells	About 1912	947	D,S	150	3	-	-	-	-	17	1945	-	-	-	-	-	-	-
BoF29-1-1	SE corner NE¼SE¼	do.	Noble Higer	About 1932	932	-	140	2	-	-	-	-	-	-	-	-	-	-	-	-	17
BoF29-1-2	SE corner NE¼SE¼	do.	do.	1932	932	D,S	67	2	60	7	Gravel	-	17	1932	-	-	-	-	-	-	-
BoF31-1	SE¼SE¼	Klein Pauley	James and Claude Kersey	Fall 1945	921	S	163	4	158	5	Limestone	158	10±	1945 and 1946	-	-	"0"	-	-	-	13
BoF34-1	NW¼NW¼SW¼	Al Laughlin	-	-	938	(D), Aban	65 or 80	3	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoF34-2	SW corner SW¼NE¼	Mrs. S. T. Reynolds	-	-	928	D,S	198	2	-	-	-	-	-	-	-	-	-	-	-	-	-
BoF34-3	NE corner NW¼SE¼	Mr. Curwell	-	About 1913	926	(Oil test) D,S	300 (1,300)	8	150	150	Limestone	150	3 to 4 11	About 1913 About 1945	-	-	"0"	-	6 1,300	-	13
BoF34-4	NW corner NE¼SE¼	James Limp	Kersey	-	930	D,S	96	-	-	-	Probably gravel	-	9±	do	-	-	-	-	-	-	-
BoF34-5	S½SE¼NE¼	J. O. Adair	do.	-	930	D,S	97	4	-	-	do.	-	9±	do	-	-	"0"	-	-	-	-
BoF34-6	SE corner SE¼NE¼	Wm. Souders	James Kersey	-	937	D,S	55	4	-	-	Sand and gravel	-	-	-	-	-	-	-	-	-	-
BoF34-7-1	NE corner NE¼SW¼	Morris Updike	Cloverdale	-	928	D	116	6	-	-	-	-	-	-	"Low"	Up to present	-	-	-	-	17
BoF34-7-2	NE corner NE¼SW¼	do.	-	-	928	S	75±	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoF34-8	SW¼NW¼NW¼	Glenn Hughes	Willard English	March 1947	943	D	74	4	70½	3½	Black gravel	-	3.0	Apr. 15, 1947	-	-	-	-	-	-	1

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoF34-9	SW¼SW¼NW¼	Guy Artmann	Willard English	Sept. 1946	937	D	145	4	132	13	Yellow limestone	132	17.29	Apr. 15, 1947	Great	Sept. 1946	-	-	-	-	13
BoF34-10	NW tip NW¼SW¼	Dodd	do.	1946	940	D	150	4	130	20	do.	130	20±	1946	-	-	-	-	1,2	-	-
BoF35-1-1	NE¼NE¼NE¼	Dan Presser	Flem Boyd	About 1940	937	(Ind) Aban	215	3	(70 210	(5±) 5	(Sand) Fine red gravel	-	42.42	Feb. 12, 1947	0 to 10	About 1940	-	-	-	-	4,17
BoF35-1-2	NE¼NE¼NE¼	do.	Clyde Kersey	do.	937	(Ind) Aban	100	6	-	-	Sand	-	-	-	Very low	do.	-	-	-	-	17
BoF35-1-3	NE¼NE¼NE¼	do.	do.	do.	937	(Ind) Aban	40	6	33	7	Sand and gravel	-	-	-	6 to 7	do.	-	-	-	-	17
BoF35-1-4	NE¼NE¼NE¼	do.	do.	About 1946	937	(Ind) Aban	215	8	(45 (80 (184 212	(15) (20) - 3	(Sand) do. do. Gravel	215	12.50	Feb. 12, 1947	20	About 1946	-	-	-	-	2(184) 4,16, 17
BoF35-1-5	NE¼NE¼NE¼	do.	Kersey or Boyd	-	937	(Ind) Aban	100?	3	-	-	-	-	20.0±	Feb. 12, 1947	Very low"	do.	-	-	-	-	17
BoF35-1-6	NE¼NE¼NE¼	do.	Earl Merritt	About 1945	937	(Ind) Aban	175?	4±	-	-	None	-	-	-	-	-	-	-	-	-	17
BoF35-1-7	NE¼NE¼NE¼	do.	do.	do.	937	(Ind) Aban	40	4	33	9	Gray gravel	-	12	1946	80	About 1946	-	-	-	-	17
BoF35-2-1	NW tip NE¼SW¼	Joe Woodard	-	-	927	D,S	90±	3	-	-	Probably sand and gravel	-	-	-	-	-	-	-	-	-	-
BoF35-2-2	NW tip NE¼SW¼	do.	-	-	927	S	18m	36±	-	-	-	-	4.70	Mar. 7, 1947	-	-	-	-	-	-	-
BoF35-3	N½NW¼SW¼	Byron L. Jones	-	-	937	D,S	65	3 or 4	-	-	-	-	-	-	-	-	-	-	1,2	-	-
BoF35-4	NW¼SE¼NW¼	Druley Parker	Flem D. Boyd	-	927	S	66m	3	-	-	Gravel	-	5.18	Apr. 15, 1947	Very good	Up to present	-	-	-	-	-
BoF36-1-1	SE corner lot W. Chicago and Kersey Ste., Lebanon	Lebanon Utilities, Inc.	Charles Krauss and Sons.	-	926	PS	104	12	-	-	Sand and gravel	-	46.1	Sept. 1943	215	July 10, 1943; Sept. 1943	10	215 -	A	-	-
BoF36-1-2A	do.	do.	do.	-	926	(PS) Aban	47	10	-	-	do.	-	21	1938	-	-	-	-	-	-	17
BoF36-1-2	do.	do.	do.	Nov. 3, 1944	926	PS	53m	8	40	13	do.	-	30.80	Mar. 23, 1945	90	Nov. 1944	3 8	90 - "Wide - open"	A	-	-
BoF36-1-3	do.	do.	A. L. Winks	1928	927	PS	104	12	64 or 94	40 or 10	do.	-	67	Sept. 27, 1944	400	1928	-	-	A	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoF36-1-4	S# corner lot, W. Chicago and Kersey Sts., Lebanon	Lebanon Utilities, Inc.	-	-	927	PS	47 41m	360	-	-	Sand and gravel	-	32±	July 1947	35±	-	-	-	A	-	-
BoF36-1-5	do.	do.	Charles Krauss and Sons.	-	927	(PS) Aban	59	12	38	21	do.	-	28	June 10, 1944	120 60	June 10, 1944	12	120 or 60	A	-	-
BoF36-1-6	do.	do.	-	-	927	(PS) Aban	97 104m	8	-	-	do.	-	68.72	May 24, 1944	-	-	-	-	A	-	-
BoF36-1-7	do.	do.	James Kersey	1928?	928	PS	105½	12	83½ 86	22 19	do.	-	43	Aug. 3, 1943	75 205	Before Aug.14, 1943 Aug. 14, 1943	33 14	-	A?	-	-
BoF36-1-8	do.	do.	do.	-	928	PS	104	8	(65)	(39)	do.	-	63.5	-	60	June 19, 1944	3	-	A	-	-
BoF36-1-10A	½ block S. of Chicago and King Sts., Lebanon	do.	do.	-	926	(PS) Aban	224 216m	12 to 10	212	12	Gravel	-	33.92	May 29, 1945	-	-	-	-	A?	-	-
BoF36-1-10	SW corner lot, W. Chicago and Kersey St., Lebanon	do.	Charles Krauss and Sons	1941	927	PS	220	10 or 12	212	8'	Sand and gravel	221	30.60	May 25, 1945	100	-	-	-	A	-	11
BoF36-1-11	do.	do.	James Kersey	Before 1907	928	(PS) Aban	230 193m	8	-	-	Gravel	230	36.54	Apr. 24, 1947	-	- -	-	-	A?	-	1
BoF36-1-12	SW corner, Franklin and Klotz Sts., Lebanon	do.	do.	-	926	(PS) Aban	145, 185, 142m	8	-	-	(Gravel)	-	27.56	do.	-	-	-	-	-	-	-
BoF36-2-1	320 N. "C" St., Lebanon	U. S. Machine Corp.	?	1945?	933	(Ind) Aban	78m	(6 orig) 12	-	-	Gravel	-	42.98	Feb.12, 1947	Small	1945?	-	-	-	-	17
BoF36-2-2	do.	do.	?	1945?	933	Ind	84?	12	-	-	do.	-	-	-	-	-	-	-	-	-	-
BoF36-2-3	do.	do.	?	Long ago	933	(Ind) Aban	32m	4	-	-	do.	-	26.83	Feb. 12, 1947	-	-	-	-	-	-	17
BoF36-2-4	do.	do.	Kersey	1941	933	Ind Aban	144	6 to 4	132	12	do.	-	-	-	"No good"	1941	-	-	-	-	17
BoF36-2-5	600 block W. South St., Lebanon	do.	James Kersey	Long ago	934	Ind Aban	175?	6	-	-	Sand?	-	-	-	Low yield	Long ago	-	-	-	-	17
BoF36-2-6	320 N. "C" St., Lebanon	do.	Clyde Kersey	About 1930	933±	Test	140	6	-	-	-	-	-	-	80	About 1930	20	80 6±	-	-	17
BoF36-3-1	"C" St. and Central Indiana RR., Lebanon	Ladoga Canning Co.	do.	do.	935	Ind Aban	140	10	130	10	Sand	140	-	-	150	do.	-	-	-	-	1,11 (60T) 17
BoF36-3-2	do.	do.	Herb Lamb	Aug. 1931 or 34	935	Ind	180 or 185	10	170±	-	Gravel	-	-	-	300 to 350	1931 or 1934	-	-	-	-	-

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BoF36-3-3	"C" St. and Central Indiana RR., Lebanon	Ladoga Canning Co.	Herb Lamb	Aug. 1933	935	Ind	173	13	-	-	Gravel	-	-	-	150	Aug. 1933	-	-	-	-	-
BoF36-4	600± Lafayette Ave., Lebanon	Standard Mfg. and Sales Corp.	James and Cliff Kersey	1925	929	Ind	165 or 96	4 or 3	-		do.	-	-	-	-	-	-	-	-	-	-
BoF36-5	156(±) N. Lebanon St., Lebanon	Avon Theatre	Cliff Kersey	About 1940	934	AC	216 or 229	6	208 or 221	8	do.	-	30	About 1940	-	-	-	-	-	-	-
BoF36-6	Pa. RR block office between W. Main and W. South Sts. ?	Penn. RR.	Layne-Ohio Co.	March 1925	937	Ind	107	-	75	20	Sand	-	-	-	-	-	-	-	-	-	1,17
BoF36-7	SW corner Pearl and Comb St., Lebanon	Boone County Farm Bureau	Jess and Jim Kersey	Long ago	932±	D	75 or (60)	3	70±	5±	Sand and gravel	-	21+	Jan. 29 1947	-	-	-	-	-	-	1
BoF36-8	SW¼NW¼	Mr. Virtue	-	do.	936±	D	20±	30±	-	-	-	-	3.64	do.	-	-	-	-	-	-	-
BoF36-9	SE¼NW¼	Miss Frazier and Mr. Kneaves	-	do.	935±	(S) Aban	62	2 to 2½	-	-	Probably Gravel	-	28.35	do.	-	-	-	-	-	-	-
BoF36-10	130± N. B St , Lebanon	Moore Coal Co.	James Kersey	do.	933	Ind Aban	60	6	52	8	Gravel	-	35 to 40	Long ago	-	-	-	-	-	-	-
BoF36-11	360± S. Coomb St., Lebanon	Nelson Sales	-	do.	933	D	26m	3	-	-	-	-	9.61	Apr. 22 1947	-	-	-	-	-	-	-
BoG2-1	"In and around Elizaville"	-	-	-	940±	D,S	190 to 210	4±	-	-	Sand and gravel	-	-	-	-	-	-	-	-	-	-
BoG2-2	NE¼NE¼	Dr. Tucker	-	About 1930	937	D	212	3	(18±) 205±	(1 to 2+)	(Gravel) Gravel	-	96?	About 1930	-	-	-	-	-	-	-
BoG4-1	SE corner SE¼SW¼	Guy Davis	A. R. Kelly	About 1940	941	D,S	211	4	201	10	Gray gravel	-	30	About 1940	10	About 1940	-	-	-	-	1, 5,7
BoG4-2-1	NW¼NE¼	Paul and Wendall Norton	do.	About 1942	933	D,S	80	4	75±	5±	Gravel	-	8	About 1942	-	-	3	6 -	-	-	1
BoG4-2-2	NE corner SE¼NW¼	do.	do.	do	931	D,S	235	-	230	5	Gray gravel	-	30	do.	-	-	-	-	-	-	1
BoG5-1	NW¼NE¼SE¼	Lyle Neal	do.	About 1942	937	D,S	314	4	310±	4±	Fine sand, gravel, and limestone	314	40	About 1942	20	About 1942	10	5 -	-	-	1, 5,6,9
BoG5-2	NW corner NE¼NE¼	Paul Morton	do.	do.	907	D,S	140	4	135	5	Gravel	-	20	do.	-	-	5	8 -	-	-	1,3, 5,6
BoG8-1	E½ E¼	Lyle Neal	do.	do.	940	D,S	304	4	300	4	Gray gravel	-	30 or 51	do.	-	-	5	8 -	-	52 1945	1,5
BoG8-2-1	SE corner SW¼SE¼	Mrs. Edward Henderson	Willard English	1946	947	-	157 145m	4	-	-	None	-	18.96	June 12, 1947	-	-	-	-	-	-	17

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoG8-2-2	SE corner SW¼SE¼	Mrs. Edward Henderson	Willard English	1946	942	-	115 109m	4	113	2	"Black gravel"	-	18.96	June 12, 1947	-	-	26	-	-	-	1,17
BoG9-1	SW¼NW¼	Mrs. Ryan	A. R. Kelly	About 1942	951	D,S	105	4	100	5	Gray gravel	-	18	About 1942	-	-	5	6 -	-	-	1,5,6
BoG9-2	SE¼NE¼NW¼	Guy Davis	do.	do.	947	D,S	160	-	156	4	do.	-	-	-	-	-	-	-	-	-	1,5,7
BoG12-1	NE¼SE¼	Ora Graham	-	Long ago	952	D,S	20m	12	-	-	-	-	6.14	June 25, 1947	-	-	-	-	-	51, June 1947	-
BoG13-1	SW¼NE¼	George Carmeck	Flem Boyd	About 1937	951	D,S	80±	4±	-	-	Gravel	-	10	1946	-	-	-	-	-	-	-
BoG14-1	SW¼NW¼NW¼	C.T. Malin	Kamp Lomax	Long ago	947	D,S	186	-	182±	4±	do.	-	30 to 40	-	-	-	-	-	-	-	-
BoG14-2	W½W½	-	do.	do.	948±	D,S	120	-	115±	5±	do.	-	18	-	-	-	-	-	-	-	-
BoG16-1	SW¼SW¼SW¼	Brown's Wonder Church	-	About 1920	959	D	100	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG17-1	SE¼SE¼	Jeanette Jaques	Higer	About 1932	954	D,S	86	3	-	-	Gravel	-	20	About 1945	-	-	-	-	-	-	-
BoG17-2	SW¼SE¼SW¼	Harry L. Lennox	-	-	943	D,S	72	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG17-3	NW¼NW¼	Anna B. Jones	Willard English	About 1945	943	D,S	232	4	-	-	-	-	35 or 40	-	-	-	-	-	-	-	-
BoG18-1-1	SW¼SE¼	W. F. Hughes	-	Long ago	944	(D,S) Aban	300	-	-	-	"Sand"	-	-	-	-	-	-	-	-	-	-
BoG18-1-2	SW¼SE¼	do.	A. R. Kelly	About 1942	941	D,S	75	6	70	5	Gray gravel	-	20 to 25	About 1942	10	About 1942	-	-	-	53, 1942	-
BoG18-2-1	NW¼SW¼SW¼	Harry Lennox	-	-	945	D,S	21	36±	-	-	-	-	5.66	Apr. 9, 1947	-	-	-	-	-	-	-
BoG18-2-2	NW¼SW¼SW¼	do.	-	-	945	S	-	3	-	-	-	-	8.07	do.	-	-	-	-	-	-	4
BoG18-3	E½SE¼NE¼	Bart Waddle	Ray Lister	Fall 1946	950	D,S	78m	4	(40) (55) 75	- - 5	(Sand) do. Gravel	-	17.46	Apr. 8, 1947	-	-	40	-	-	-	6
BoG19-1	SW¼SE¼	Mrs. John Reynolds	Taylor	1941	941	S	55	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG19-2	SW¼SE¼SE¼	Paul R. Honan	do.	do.	948	D	42	4	-	-	Fine gravel	-	20±	1941	-	-	-	-	-	-	-
BoG20-1	Center NW¼SW¼	Sarah and Jennie Bryan	-	-	954	S	14m	48±	-	-	Gravel	-	8.4	Apr. 2, 1947	-	-	-	-	-	-	-
BoG20-2-1	SE corner SE¼NW¼	John Powell	Flem Boyd	About 1936	950	D,S	74	3	70±	4±	Sand	-	-	-	-	-	-	-	5	-	-
BoG20-2-2	SW¼NE¼	do.	Amos Huston	1895	944	D,S	114	2	-	-	-	-	-	-	2	About 1945	-	-	-	-	-

Records of wells in Boone County, Indiana—Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoG20-3	S½S½NW¼NE¼	Clarence Deatley	-	Long ago	944	D,S	90	2	-	-	Gravel	-	20	About 1945	-	-	-	-	-	-	-
BoG21-1	SW corner SW¼SW¼	H. S. Cole	-	-	949	D,S	85 or 178	4	-	-	-	-	17±	-	-	-	-	-	-	-	-
BoG21-2	SE¼SW¼	Fred Roe	-	-	943	D,S	90	3	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG21-3	NE¼SE¼	Dorothy Flanagan	-	-	945	D,S	160±	2	-	-	-	-	7±	About 1945	-	-	-	-	-	-	-
BoG22-1-1	W. end NW¼SW¼	do.	A. R. Kelly	Spring 1945	944	D,S	38 or 67	4	-	-	Red gravel	-	12 or 8	-	7	Spring 1945	-	-	-	-	-
BoG22-1-2	E. end NW¼SW¼	do.	do.	do.	944	S	171	4	168	3	Fine gravel	-	35 or 20	-	6	do.	15	6 -	-	52 Apr. 1945	5
BoG22-2	SW¼SW¼	Noble Snider	Ruston Weaver	1911	946	D,S	28	2½	22±	6±	Gray gravel	-	+(Overflow) 12	Spring Fall	-	-	-	-	-	-	-
BoG24-1	SW¼SW¼	Frank W. Abke	-	-	956	D	30	4	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoG26-1	SE¼SW¼	Helen Eisenhower	Harold Lister	Dec. 1944	962	D,S	120	4	110	30	"Sand"	-	11	Jan. 1945	-	-	-	-	-	-	-
BoG26-2	SW¼SE¼	Frank Hackett	-	-	958	D,S	200	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG27-1	SW¼SE¼	Fred Bartlett	-	-	961	D,S	40?	-	-	-	-	-	-	-	Very good well	Up to present	-	-	-	-	-
BoG27-2	SW¼SW¼	J. E. Hart	Harold Lister	-	957	D,S	92	4	-	-	-	-	-	-	-	-	-	-	-	-	6
BoG28-1	SW¼SW¼	Edward L. Goeke	-	1940	947	D	160	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG28-2	SW corner NE¼SW¼	H. W. Scott	- and Flem Boyd	-	947	D,S	135±	-	-	-	"Sand"	-	25 to 30	About 1940	-	-	-	-	-	-	2(130±)
BoG28-3	NE¼NW¼	John Lovingfess	-	-	945±	(S) Aban	13m	36	-	-	-	-	2.10	Apr. 2, 1947	-	-	-	-	-	-	-
BoG28-4	NW¼NE¼	Isaac Miller	-	-	943	D	17	4	0	17±	Gravel	-	-	-	-	-	-	-	-	-	-
BoG28-5	NE¼NE¼	Roy Shephard	-	-	946	D,S	225	2	-	-	-	-	40±	1947	-	-	-	-	-	-	-
BoG29-1-1	SW¼NE¼SE¼	Fred Roe	-	-	947	(D,S) Aban	21	2	-	-	Probably gravel	-	4.52	Apr. 3, 1947	-	-	-	-	-	-	-
BoG29-1-2	SW¼NE¼SE¼	do.	Harold Lister	Spring 1945	947	D,S	145	4	(70) 140±	-	(Dirty Sand) Sand and gravel	204?	-	-	-	-	-	-	-	-	-
BoG29-2	SE corner SE¼NE¼	John Lovingfess	-	-	949	D,S	55	1¼	-	-	Gravel	-	11	Summer 1943	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoG29-3	SW¼NW¼	A. L. Lafaverf	-	-	948	D,S	56	4	-	-	-	-	10±	About 1946	-	-	-	-	-	-	-
BoG29-4-1	SW corner NW¼SW¼	Nelson Eisenhouser	Clyde Kersey	1947	946	D,S	132	4	-	-	Gravel	-	12.40	Apr. 3, 1947	-	-	-	-	-	-	8
BoG29-4-2	NW corner NE¼SW¼	do.	-	-	951	S	160?	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG29-4-3	SE¼SW¼	do.	James Kersey	"Long ago"	939±	S	260	2	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoG29-5	SE¼NE¼	Charles Bowman	R. A. Holt and Sons	1936	941	D,S	194	47	-	-	Gray gravel	-	12	About 1941	10½	1936	-	-	-	-	-
BoG30-1	¾NW¼SW¼	City of Lebanon	Charles Krauss and Sons	-	943±	PS	50	8	-	-	Probably gravel	-	-	-	150	"Originally"	-	-	-	-	-
BoG31-1	100± E. Main St., Lebanon	-	-	Before 1887	940±	-	18+	-	(14) 18	(4) -	Sand Gravel	-	-	-	-	-	-	-	-	-	-
BoG31-2	300± SW of junc. of Elm St. and Indpls. Ave., Lebanon	Industrial Land Co. of Indpls.	James and Cliff Kersey	About 1917	936	(Ind) Aban	230	8 (orig 3)	220 (212)	10 (18)	Sand and gravel	230? -	18 26.5	About 1917 Oct. 4, 1935	-	-	-	-	5	-	4
BoG31-3	300 E. Elm St., Lebanon	Lebanon Utilities, Inc.	-	-	948	(PS) Aban	143m	6	-	-	-	-	37.64	Mar.14, 1947	-	-	-	-	-	-	1
BoG31-4-1	NE corner Meridian and Elm Sts., Lebanon	Lebanon Ice and Storage Co.	James Kersey and Sons	About 1910	949	Ind	156m	6	150	6	Gravel	-	17 40.5	1910 Jan.29, 1946	25 to 30	Up to present	60±	-	-	-	-
BoG31-4-2	NE corner Meridian and Elm Sts.	do.	do.	-	949	-	175	8	-	-	-	175?	-	-	-	-	-	-	-	-	17
BoG31-4-3	do.	do.	do.	-	949	Ind	156	-	-	-	Gravel	-	-	-	10	Up to present	-	-	-	-	-
BoG31-5	E. Walnut St. and Indpls Ave., Lebanon	Indiana Condensed Milk Co.	Charles Krauss and Sons	1928 or 1930	942	(Ind) Aban	87 130m	6 10	(30) (102)	(12) (3)	(Gravel) do.	130?	11.27	Feb.13, 1947	200	1928 or 1930 1935 or 1940	-	-	-	-	-
BoG31-6	719 Indpls. Ave., Lebanon	Pleasant Shoemaker	-	"Long ago"	935	S	30±	36±	-	-	Gravel	-	9±	About 1930	-	-	-	-	"1 in summer"	-	-
BoG31-7	632± Indpls. Ave., Lebanon	-	-	do.	939±	(D) Aban	110	2 or 3	-	-	"Sand"	-	-	-	-	-	-	-	-	-	-
BoG31-8	519± Indpls.,Ave., Lebanon	Honan-Crane Co.	Harry Fox	1943 or 1945	933	(Ind) Aban	108	6 or 8	(60) 103±	- 5±	(Sand) (Gravel)	-	-	-	-	-	-	-	-	-	-
BoG31-9-1	NW¼NE¼	Mrs. Harry Bohannon	-	-	936	S	13	30±	-	-	Probably gravel	-	3.06	Apr. 8 1947	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoG31-9-2	NW¼NE¼	Mrs. Harry Bohannon	-	About 1925	936	D,S	65	4	60± (75) (150)	(5±) - -	"Sand" (Sand and gravel)	230	13±	1930 or 1935	-	-	-	-	Good	-	11
BoG31-9-3	NW¼NE¼	do.	A. R Kelly	1939	936	S	64m	4	-	-	Gravel	-	4.40	Apr. 8, 1947	-	-	"3½"	-	-	-	-
BoG32-1	SE¼SW¼	Vandie Stark	Thomas Walton and Flem Boyd	"Long ago"	937	D,S	58	3	50	8	Green gravel	-	9	"Original"	7	"Long ago"	-	-	-	-	1
BoG32-2	SW¼NW¼	Curt Ayers	-	-	945	D,S	170±	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG32-3	SW¼NW¼	Lummie Cannidy	-	-	941	D	85	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG32-4	SW¼NW¼	Edith Deer	-	1907	941	D,S	134	2±	-	-	-	-	-	-	-	-	-	-	-	-	-
BoG32-5	NW corner NW¼NW¼	Joseph Bart	Flem Boyd	1935	949	D,S	140 or 125	3	-	-	Gravel and sand	-	25±	About 1945	-	-	-	-	-	-	-
BoG32-6	Center SE¼NE¼	Ira Bradley	-	1912	950	D,S	246	4	-	-	Sand and gravel	-	45±	1941	-	-	-	-	2	-	-
BoG32-7	SE¼SE¼	J. A. Beaty	-	-	937	D,S	146	-	-	-	Probably gravel	-	-	-	-	-	-	-	-	-	4
BoG33-1	NW corner SE¼NW¼	H. C. Goeke	-	-	967	D,S	75	4	-	-	-	-	20	About 1945	-	-	-	-	-	-	-
BoG33-2	SE¼NW¼	Clayton Sicks	Flem Boyd	About 1935	954	D,S	57	-	52	5	Sand and gravel	-	10±	When drilled	-	-	-	-	-	-	-
BoG33-3	SW corner NW¼NE¼	Lyle Cason	Rudolph Krier	About 1936	953	D,S	73	3 or 4	72	1	do.	-	20	-	Weak well	Up to present	-	-	-	-	-
BoG33-4	SW corner NE¼NE¼	Ed Adair	James Kersey and Son	About 1933	956	D,S	97	3½	(50) 93	4 -	(Sand, gravel) Sand, gravel	-	6	-	-	-	1½	- 12	-	-	-
BoG33-5	SE¼SE¼	T. L. Short and C. R. McCain	-	-	958	D,S	200±	4	-	-	-	-	55	About 1946	-	-	-	-	-	-	-
BoG33-6	SW¼SW¼	Wm. Beatty	-	-	949	D,S	132	-	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoG34-1	W½SW¼SW¼	C. R. Riddle	-	-	955	D,S	18	-	18	-	do.	-	-	-	6±	1945	"0"	-	-	-	-
BoG34-2	W½SE¼	Sylvester O'Brien	-	-	960	D,S	24	-	-	-	do.	-	-	-	-	-	-	-	-	-	-
BoG34-3	W½NE¼	A. F. Bart and F. Hedge	-	-	961	D,S	100	2	-	-	Sand and gravel	-	-	-	"Low"	Up to present	-	-	-	-	-
BoG34-4	NW corner SW¼NW¼	Charles R. Jenkins	-	-	956	D,S	140	4	-	-	-	-	35?	-	-	-	-	-	-	-	-
BoG35-1-1	NW¼NE¼	W. H. Peterman	-	-	963	D,S	140	4	-	-	Probably gravel	140?	-	-	-	-	-	-	-	-	-
BoG35-1-2	NE¼NW¼	do.	-	-	957	D,S	35	-	-	-	do.	-	-	-	High	Up to present	-	-	-	-	-
BoG36-1	SW corner SW¼SE¼	Carl Bratton	-	-	953	D,S	13m	12	-	-	do.	-	1.21	Apr. 2, 1947	-	-	-	-	-	-	-
BoG36-2	SE¼NE¼	John Perkins	-	-	963	D	195	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoG36-3	NE¼NE¼NE¼	B. A. Arnold	Kamp Lomax	-	956	D,S	95	4	-	-	Sand and gravel	-	16	-	-	-	-	-	-	-	4
BoG36-4	W½NE¼NE¼NE¼	Martin Nolte	Claude Kersey	-	959	D,S	120±	4	-	-	Probably gravel	-	-	-	-	-	-	-	-	-	-
BoG36-5	W½W½NW¼	Frank Hackett	-	-	965±	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoH1-1	2 miles W. and 1 mile S. of Sheridan	-	Kamp Lomax	1929	938±	D,S	135	3	130	5	Gravel	-	17	1929	-	-	-	-	-	-	-
BoH1-2	SW¼SW¼SE¼	Lemon Snow	Kamp Lomax and Son	1933	938	D,S	157	4	137	20	do.	-	17±	1933	-	-	-	-	-	52 June 1947	-
BoH4-1	NW¼NW¼	Edward Padgett	Blaine Rader	About 1917	949	D,S	200	3	-	-	do.	-	30 35	About 1917 1947	-	-	-	-	-	-	-
BoH14-1	SW¼SE¼SE¼	Thompson Jones	Burton	Sept. 1911	956	D,S	215½	4	198	17½	Limestone	198	38±	Sept. 1911	-	-	-	-	-	54 June 1947	13
BoH16-1	SE¼NW¼	Frank Smith	Kenny Haffner	Fall 1946	967	D,S	216	4	-	-	do.	216	21	Fall 1946	-	-	-	-	-	57 (?) Feb. 1947	13
BoH19-1	NE¼NW¼	Anthony Kincaid	Claude Kersey	1941 or 1942	954	D,S	57	4	-	-	Gravel	-	18	1941 or 1942	-	-	-	-	-	-	-
BoH19-2	SE¼NW¼	E. Clarence Kincaid	Vernon Carlin	Fall 1946	951	D,S	40m	3	32	8	do.	-	6.90	June 13 1947	-	-	-	-	-	-	-
BoG20-1	SW¼NE¼NE¼	Lydia Bell	Clyde Kersey	-	957	D,S	212	3 or 4	200	12	Limestone	-	29	When drilled	-	-	-	-	-	-	13
BoH21-1-1	S½NW¼NE¼	Guy Burns	-	-	962	(S) Aban	21m	36	-	-	Probably gravel	-	4.94	June 25 1947	-	-	-	-	-	-	-
BoH21-1-2	S½NW¼NE¼	do	Earl Merritt	Spring 1947	963	D,S	46m	4	"35"	"12"	Gravel	-	11.42	do.	50	Spring 1947	0.04	5 -	-	51¼ Apr. 1947	-
BoH21-2	NW corner NW¼NE¼	George Whaley	Vernon Carlin	Winter 1946	963	D	68	3	(42) 85±	- -	(Sand, gravel) Gravel	-	8	Winter 1946	-	-	-	-	-	-	-
BoH26-1	NE¼NE¼NE¼	Howard and Owen Richardson	-	-	931	S	20	-	-	-	do.	-	3±	1947	-	-	-	-	-	-	53 June 1947
BoH28-1	SE¼SE¼SW¼	Roy Artman	Herb Lamb	1941	948	D,S	178½	4	173	5	do.	-	36	1941	13	1941	"0"	13 -	-	-	4(173)
BoH29-1	NW corner SW¼SE¼	Edward Jackson	Willard English	About 1945	942	D,S	183	4	180±	6±	"Sand"	-	40	1947	-	-	-	-	-	-	-
BoH31-1	"At Gadsden"	-	-	Before 1908	956±	D,S	14 to 150	-	-	-	Gravel	-	12	1907	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoH31-2-1	SW¼NE¼	William Atkins	Ray Lister	Summer 1946	956	-	393	4	-	-	-	210±	-	-	-	-	-	-	-	-	1,17
BoH31-2-2	SW¼NE¼	do.	do.	Summer 1946	956	D	61	4	(57) 59	(2) 2	(Sand) Gravel	-	12½	Summer 1946	6+	Summer 1946	"O"	-	-	-	1
BoH31-3	SE¼NW¼	Marion Swinford	do.	Oct. 1945	956	D	149	4	-	-	-	-	45±	Oct. 1945	-	-	-	-	1	-	-
BoH33-1	SW¼SE¼	C. T. Moreland	Earl Merritt	About 1945	942	D,S	157	-	154	3	Gravel	-	55	About 1945	-	-	-	-	-	-	1
BoH34-1	"Section of average wells at Moreston"	-	-	Before 1908	940±	D,S	15 to 175	-	-	-	do.	-	1 to 10	1907	-	-	-	-	-	-	1,W7
G-BoH34-2	300 ft. S of north line 150 ft. E of west line NW¼NE¼	Henry A. Marshall	N. N. Smith et al	Aug. 21 1940	928	Gas and oil test	1,825	8 to 6 5/8	(69) (176) (215)	(5) (11) (67)	(Gravel) (Sand) (Limestone)	197	-	-	-	-	-	-	-	-	1
BoH34-3-1	W½SE¼SE¼	Indiana Condensed Milk Co.	Kemp Lomax	-	922	Aban	184m	2½	-	-	-	-	25.5	Feb. 14 1947	-	-	-	-	-	-	-
BoH34-3-2	W½SE¼SE¼	do.	Kemp Lomax ?	-	922	D,S	200+	6 or 8	-	-	-	-	20 to 40?	-	-	-	-	-	-	-	-
BoH34-4	NW¼SE¼	Hayes	Willard English	About 1946	929	D	95	4	90	5	Black gravel	-	19	About 1946	-	-	-	-	-	-	1
BoI2-1-1	NW¼SW¼SW¼	Jess Emmerts	Claude Kersey	About 1940	920	(D,S) Aban	38	2	-	-	Gravel	-	8±D	About 1940	-	-	-	-	-	-	-
BoI2-1-2	NW¼SW¼SW¼	do.	Ray Lister	About 1942	920	D,S	156	3	150	6	"Blue shale"	150	14	About 1942	-	-	"O"	-	-	52½ July 1947	11
BoI3-1	SE¼NE¼SE¼	Jesse Wills	-	-	918	D,S	38	6	-	-	-	-	-	-	-	-	-	-	-	-	-
BoI4-1	SE¼SW¼SW¼	Albert Garner	-	-	899	D,S	60±	2	-	-	Limestone	-	6±	About 1946	-	-	-	-	-	-	-
BoI6-1	W½SE¼	H. Cecil Brashar	Claude Kersey	About 1940	887	D,S	53	-	40	13	do.	40	3 to 4	About 1940	Good well	About 1940	-	-	-	-	-
BoI12-1	SE¼SE¼	Robert Keagan	Willard English	About 1945	933	D	146	4	119	27	"Blue shale"	119	30	About 1945	-	-	-	-	-	-	6(1197)
BoI12-2	SE¼SE¼	-	Flem Boyd	About 1930	932	D,S	106	-	100±	6±	Limestone	100±	10±	About 1930	-	-	-	-	-	-	-
BoI13-1	NE¼NE¼NE¼	Mark Beck	James Kersey	Before 1919	929	D,S	93±	3	-	-	do.	-	+ 3±	About 1920 1947	-	-	-	-	-	-	-
BoI14-1	SW¼SW¼SW¼	Advance Lumber Co.	Willard English	About 1946	930	D	75	4	67	8	Blue shale	67	9±	About 1946	-	-	-	-	-	-	-
BoI16-1	SW¼SE¼	Baxter Reed	-	Before 1938	921	D,S	75?	4	-	-	-	-	8	About 1940	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoI18-1-1	NE¼NW¼	Everett Smith	-	-	896	D,S	65	2	50±	15	"Rock"	-	11.9	July 1, 1947	-	-	-	-	-	52½ July 1947	-
BoI18-1-2	NE¼NW¼	do.	-	-	896	S	65	2	50±	15	do.	-	-	-	-	-	-	-	-	-	-
BoI28-1-3	NW corner SE¼NW¼	do.	Willard English	About 1945	896	S	52	4	47	5	"Yellow open-pored rock"	47	9±	About 1945	Very good well	Up to present	1±	- 4	-	-	-
BoI18-1-4	NE¼NW¼	do.	Roy A. Holt and Sons	1947	896	D	90±	4	50±	40±	White and blue rock	50±	16	Spring 1947	-	-	25±	-	-	-	1
BoI22-1	NE¼NE¼	-	Flem Boyd	About 1930	930	D	36	-	32±	4±	Limestone	32±	10±	About 1930	-	-	-	-	-	-	1
BoI22-2	NE corner NE¼NE¼	Town of Advance	Beaver and Caldwell	-	930	D	66m	2	64?	2?	do.	64?	6.66	July 1, 1947	-	-	-	-	-	-	-
BoI23-1	NW corner NW¼NW¼	do.	-	Before 1907	930	-	90	2	60 to 65	30 to 25	do.	60 to 65	8	1907	-	-	-	-	A	-	-
BoI23-2-1	N½SW¼NW¼	O. L. Walker	Beaver and Caldwell	About 1910	926	D,S	45	2	-	-	Gravel	-	6	About 1945	8½±	About 1910	6	8½± -	-	-	-
BoI23-2-2	NE corner SW¼NW¼	do.	Willard English	About 1946	926	D,S	40	4	38	2	do.	-	10	1946	-	-	-	- -	-	-	-
BoI23-3-1	NE¼SW¼NW¼	Town of Advance	Holt Brothers	May 1947	926	PS	38	10	(15) 28	(1) 10	(Sand) Gravel	-	3.00	July 1, 1947	74	May 1947	23	74 24	A	-	1
BoI23-3-2	NE¼SW¼NW¼	do.	do.	do.	926	PS	45±	10	30	5±	Sand and fine gravel	-	-	-	-	-	-	-	A	-	17
BoI23-4	NW¼NW¼NW¼	Mr. Canada	Willard English	-	930	D	95	4	67	28	Blue shale	67	-	-	-	-	-	-	-	-	-
BoI24-1-1	SE corner SW¼SE¼	Bert Cook	-	"Long ago"	939	S	90 to 100	2	-	-	Rock	-	10±	About 1942	-	-	-	-	1,2	-	-
BoI24-1-2	E½NW¼SE¼	do.	-	About 1937	939	S	49	4	-	-	Gravel	-	10	About 1937	-	-	-	-	4	-	-
BoI24-1-3	SE corner SW¼SE¼	do.	Roy A. Holt	Winter 1942	939	D	99	4	89±	10±	Rock	89±	10±	Winter 1942	Weak well	Up to present	-	-	-	-	-
BoI25-1	NW corner NE¼NE¼	Mrs. H. Shelly and Wm. Pratt	Beckelhammer	About 1893	942	(D,S) Aban	200± 177m	5 5/8	-	-	Gravel	-	10.70	July 2, 1947	-	-	-	-	-	-	-
BoI29-1	NW¼NW¼	George Canada	Willard English	Summer 1946	912	D	112	-	70	42	Hard white limestone	70	18	Summer 1946	-	-	-	-	-	-	-
BoI32-1-	W½SE¼NE¼	Dan F. Roberts	Earl Merritt	1945	934	S	60	-	55	7	Gravel	-	15	1945	Very good well	About 1945	-	-	-	-	-
BoI34-1-1	NW¼NW¼SW¼	Dr. Higgins	Flem Boyd	-	956	-	100±	-	-	-	-	-	-	-	-	-	-	-	-	-	11,17
BoI34-1-2	NW¼NW¼SW¼	do.	do.	-	956	-	100±	-	-	-	-	-	-	-	-	-	-	-	-	-	11,17

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoI34-1-3	NW¼NW¼SW¼	Dr. Higgins	Flem Boyd	–	956	–	160	–	–	–	–	100±	–	–	–		–	–	–	–	11(60T), 17
BoI34-1-4	NW¼NE¼SW¼	do.	do.	–	956	D,S	70	3±	–	–	Sand	–	–	–	Weak well	Up to present	–	–	–	–	–
BoI35-1-1	S½NW¼	Granville Wells	Claude Kersey	–	958	–	200	–	–	–	–	200	–	–	–	–	–	–	–	–	11,17
BoI35-1-2	S½NW¼	do.	do.	–	958	D,S	50	4	40±	10	Gravel	–	–	–	–	–	–	–	Good	–	–
BoI36-1	SW corner NW¼NE¼	William E. Huffman	Ed Walls	July 1919	966	D,S	118	3	100	18	Limestone	100	19	1942 to 1945	Weak well	Up to present	41	–	–	–	–
BoJ1-1	NW¼NE¼	Joe LaBolle	Claude Kersey	Spring 1945	938	D,S	113	4	(75) 109	(18) 4	(Quicksand) Gravel	–	307	Spring 1945	–	–	–	–	–	–	–
BoJ1-2-1	NE¼NW¼	Jean Grindley	–	Long ago	947	D,S	119	3	–	–	–	–	20	Long ago	–	–	–	–	–	–	–
BoJ1-2-2	Center E½W½	do.	–	do.	931	S	195	3	–	–	–	–	7	–	–	–	–	–	–	–	–
BoJ1-3-1	NE¼NW¼	Pennsylvania RR.	Layne-Northern Co.	Mar. 2, 1925	947±	–	189	–	175	14	Cemented gravel	–	20	–	–	–	–	–	–	–	1,17
BoJ1-3-2	NE¼NW¼	do.	James Kersey	About 1930	945±	–	135	–	120	15	do.	–	–	–	.65	About 1930	–	–	–	–	17
BoJ1-4	Center NE¼SE¼	Hazel Ruth Powell	James and Cliff Kersey	About 1928	957	D,S	218	4	200	18	Hard limestone or green shale	200	60±	About 1928	–	–	–	–	–	–	13 or 16
BoJ2-1-1	NW¼NE¼	Wilbur A. Small	Ed Walls	1917	938	(D,S) Aban	48	3	–	–	"Sand"	–	16	1917	–	–	–	–	1,2, 3	–	–
BoJ2-1-2	NW¼NE¼	do.	Flem Boyd	Summer 1946	937	D,S	92	3	(48) 90?	(2) 2?	"Sand" Gravel and sand	–	22	Summer 1946	–	–	–	–	–	–	–
BoJ2-2-1	NW¼NE¼SE¼	U. W. Pennington and Son	Ed Walls	1917	943	(S) Aban	46	3	–	–	Gravel	–	7.87	Mar. 6, 1947	–	–	–	–	–	–	–
BoJ2-2-2	NE¼NW¼SE¼	do.	do.	1907	943	D,S	48	3	–	–	do.	–	12	About 1945	–	–	–	–	–	–	–
BoJ2-3	NE corner NE¼NE¼	Henry Walleske	–	–	936	D,S	33m	1¼	–	–	do.	–	8.40	Apr. 18, 1947	–	–	"0"	–	–	51½ Apr. 1947	–
BoJ2-4	NW¼NW¼	Fritz Richman	?	"Long ago"	942	S	40m	3	–	–	Probably gravel	–	19.81	July 18 1947	–	–	–	–	–	–	–
BoJ3-1-1	NW tip NW¼SE¼	Harry McMains	–	do.	935	D,S	55	2	–	–	Gravel	–	–	–	–	–	–	–	–	–	–
BoJ3-1-2	SW tip SW¼NE¼	do.	Rudolph Krier	1943	935	S	78	3	–	–	"Sand"	–	–	–	–	–	–	–	–	–	–
BoJ3-1-3	Center W½SE¼SE¼	do.	–	–	936	S	120	2	–	–	–	–	–	–	–	–	–	–	–	–	–
BoJ3-2	NE¼SE¼	Raymond Goff	–	–	931	D,S	79	2	–	–	Probably sand and gravel	–	9	1945	–	–	–	–	–	–	–

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoJ4-1	NE¼SE¼	Raymond Goff	Ed Walls	About 1920	926	S	81	3	-	-	Gravel	-	2.0	June 27, 1947	Very good well	Up to present	-	-	-	-	-
BoJ5-1	NE corner SE¼NW¼	Bill Nicholson	-	Before 1910	941	D,S	150±	4	-	-	Limestone?	-	25	About 1945	-	-	-	-	-	-	-
BoJ5-2	SE corner SW¼NW¼	Lester Curwell	-	-	934	D,S	175	-	-	-	Limestone	-	-	-	-	-	-	-	-	-	-
BoJ6-1	SE corner SE¼NE¼	John Price	Ed Walls	About 1907	933	D,S	93	2	-	-	Sand and gravel	-	8	Summer 1947	-	-	-	-	-	-	-
BoJ7-1	SW corner SW¼SW¼	John Adgms	Ray Linter	About 1946	932	D	53	-	-	-	do.	-	-	-	-	-	-	-	-	-	-
BoJ7-2	SE¼SW¼SW¼	Millard Copeland	do.	Summer 1946	932	D,S	80±	4	-	-	Limestone	73±	2±	Summer 1946	-	-	-	-	-	-	13
BoJ8-1	SW corner NE¼SE¼	Cyrus Creasey	Shopstone Hillis	About 1910	952	D,S	115	-	103	12	White limestone	-	15 20	1910 About 1930	-	-	-	-	-	-	-
BoJ8-2	NW corner SE¼NE¼	Lloyd Hopkins	Willard English	1946	943	D,S	58±	4	-	-	Gravel	-	Less than 20	1946	-	-	-	-	-	-	-
BoJ10-1	Center W½SW¼NE¼	Kenneth Dale	-	-	929	D,S	28	2½	-	-	do.	-	6	June 1942	-	-	"0"	-	-	-	-
BoJ10-2-1	SW¼NW¼	Howard Bennington	-	-	932	S	26	24	-	-	-	-	6	1947	-	-	-	-	-	-	-
BoJ10-2-2	SW¼NW¼	do.	Rudolph Krier	About 1936	932	D	88	4	(51) (80) 88	(4) (3) 2	Sand and gravel	-	12	1947	-	-	60	- 1	-	-	-
BoJ11-1-1	SE¼NE¼NE¼	Earl Linton	Seth Agan	About 1915	943	D,S	149	2	147	2	Yellow limestone	147	18±	About 1915	-	-	-	-	-	-	15
BoJ11-1-2	SE¼NE¼NE¼	do.	Seth Agan (?)	About 1890	943	S	135	3	?	?	Gravel	-	6 to 7	About 1945	-	-	-	-	-	-	-
BoJ11-2-1 to 3	SW¼NE¼	Squire E. Lee	-	1920 or 30	942	D,S	22 or 33	-	-	-	do.	-	10±	About 1930	-	-	-	-	-	-	-
BoJ11-3	SW¼SE¼SW¼	Frank Kelly	Flem Boyd	1940	941	D,S	136	3	-	-	do.	-	13±	1940	-	-	-	-	-	-	-
BoJ12-1-1	NW¼NW¼NE¼	T. W. Saltmarsh	Claude Kersey	1943	950	D,S Irr.	80	3	72±	8±	Gray gravel	-	16±	1943	-	-	-	-	-	-	-
BoJ12-1-2	NW¼NW¼NE¼	do.	-	-	955	(S) Aban	21	1½	-	-	Gravel	-	10.85	Apr.17, 1945	-	-	-	-	-	-	-
BoJ12-2	NE¼SW¼	Emmert Thompson	Cecil Holt	1941	954	D,S	253	4	(95) 250	(1) 3	(Sand) Gravel	-	36	1941	15+	1941	"0"	15 8	Good	-	1
BoJ12-3	NW¼SE¼	Charles Hines	Flem Boyd	1930 or 1935	962	S	282	3	(225) (260) 276 281	(5) (6) 5 1	(Sand and gravel) (Sand) Gravel Limestone	281	37	1930 or 1935	18	1930 or 1935	-	-	-	-	1,4(225)

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoJ12-4	SE¼NW¼NW¼	Ray Quellhorst	-	-	942±	D,S	22±	3	-	-	Gravel	-	-	-	-	-	-	-	-	-	Pumps a little sand
BoJ13-1	*3 mi. S. of Lebanon	-	Flem Boyd	-	946±	-	-	-	-	-	Limestone	200	-	-	-	-	-	-	-	-	13
BoJ13-2	NE¼SW¼	John E. Lasley, Jr.	-	About 1940	956	D,S	198	4	-	-	Gravel	-	20±	1940	-	-	-	-	-	-	-
BoJ13-3-1	NE¼SE¼SW¼	C. G. Antcliff	-	-	936	S	9m	30±	-	-	do.	2.13	2.13	Apr.17, 1947	-	-	-	-	-	-	-
BoJ13-3-2	NE¼SE¼SW¼	do.	-	-	939	(D) Aban	36m	1½	-	-	do.	-	4.90	do.	Low	-	-	-	-	-	-
BoJ14-1-1	SE¼NW¼NW¼	Earl Miller	-	-	948	(D) Aban	27m	30±	-	-	do.	-	3.50	do.	-	-	-	-	-	-	-
BoJ14-1-2	SE¼NW¼NW¼	do.	Flem Boyd	-	948	(D) Aban	49m	2	-	-	do.	-	6.51	do.	-	-	-	-	-	-	-
BoJ14-1-3	SE¼NW¼NW¼	do.	Raymond Lister	Spring 1946	948	D,S	172	4	-	-	do.	-	18	Spring 1946	-	-	-	-	-	-	-
BoJ14-1-4	NW corner SW¼NE¼	do.	Claude Kersey	1942	948	S	50 42m	3	-	-	do.	-	4.76	Apr.17, 1947	-	-	-	-	-	-	-
BoJ15-1	NE¼NE¼	Charles Pearl	do.	1942	947	D,S	105	3 or 4	101	4	do.	-	16	About 1942	-	-	-	-	-	-	4(101) 165
BoJ15-2-1	NE¼SW¼NW¼	Charles E. Powell	Armstrong and Sutton	About 1927	946	D,S	129	4	114	15	Limestone	114	13±	About 1927	-	-	-	-	-	-	-
BoJ15-2-2	NE¼NW¼NW¼	do.	-	-	946	D,S	35±	2½ or 3	-	-	Gravel	-	10 to 15	About 1945	-	-	-	-	-	-	-
BoJ16-1-1	SE¼NW¼SE¼	Mr. D. D. Budd	-	Long ago	953	D,S	30	1½	-	-	do.	-	10±	1945 or 1947	-	-	-	-	-	-	-
BoJ16-1-2	SE corner NW¼SE¼	do.	Amos Huston ?	About 1912	940	S	160	3	100	60	Limestone	100	3½	do.	-	-	-	-	-	-	-
BoJ17-1	NE¼SE¼SE¼	J. O. Creamy	James Kersey	-	952	D,S	90±	6	70±	20±	do.	70±	20	About 1945	-	-	-	-	-	-	-
BoJ21-1	N½SE¼SW¼	Claud Williams	Flem Boyd	About 1912	939	D,S	71	4	70	1	Rock	70	10±	About 1930	-	-	-	-	-	-	-
BoJ22-1	E½SW¼NW¼	do.	do.	About 1925	949	D,S	83±	4	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoJ23-1-1	NW¼NE¼	Leland N. Dale	-	-	952	(D) Aban	16m	36	-	-	-	-	1.86 5.10	June 1946 August 1946	-	-	-	-	-	-	-
BoJ23-1-2	NW¼NE¼	do.	-	-	952	(S) Aban	19m	40	-	-	-	-	0.56 5.70	Apr.21, 1947 Sept.13, 1947	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana—Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoJ24-1	"½ mi. S. of Lebanon"	-	Flem Boyd	-	953±	-	-	-	-	-	-	200	-	-	-	-	-	-	-	-	11
BoJ26-1	Center sec. 26, at Milledgeville	"Average section of wells"	-	Before 1887	967±	D	12 to 42	-	6 to 12	1 to 10	Gravel and sand	-	-	-	-	-	-	-	-	-	1,*7
BoJ26-2	$NE_4^1NE_4^1$	Herman Lasex	-	-	952	D,S	87	3	-	-	Gravel	-	12	About 1946	"Good"	Up to present	-	-	"Good"	-	-
BoJ26-3	$NW_4^1NE_4^1$	William Shirley	Flem Boyd	-	955	D,S	60	-	-	-	Sand and gravel	-	10±D	- -	-	-	-	-	-	-	-
BoJ26-4	SE corner $SE_4^1NW_4^1$	Milledgeville Church	do.	-	964	D	65±	-	50	15±	Limestone	50	10±	-	-	-	-	-	-	-	-
BoJ26-5	$SW_4^1SW_4^1NE_4^1$	Milledge General Store	do.	About 1905	967	D	64	-	60±	4±	do.	60±	10±	-	-	-	-	-	-	-	-
BoJ26-6	Near center sec. 26	Mr. Fulwider	do.	-	958	D,S	90	2½	88	2	do.	88	-	-	-	-	-	-	-	-	-
BoJ26-7	Near center sec. 26	-	Flem Boyd or Seth Agan	-	954	S	70	2½	68	2	do.	68	-	-	-	-	-	-	-	-	-
BoJ27-1	SE corner $NW_4^1NW_4^1$	Claud Williams	Flem Boyd	-	947	S	20±	4	-	-	Probably gravel	-	9.97	July 2, 1947	"Poor well"	-	-	-	-	53½ July 1947	- -
BoJ31-1-1	$NW_4^1NW_4^1SW_4^1$	James Martin	Willard English	Aug. 1946	966	-	178	4	-	-	-	80	-	-	-	-	-	-	-	-	13,17
BoJ31-1-2	$NW_4^1NW_4^1SW_4^1$	do.	Kenny Haffner	1946	966	-	270	-	-	-	-	-	-	-	-	-	-	-	-	-	17
BoJ31-1-3	$NW_4^1NW_4^1SW_4^1$	do.	do.	1947	966	D	40	-	-	-	Sand, gravel	-	-	-	Very poor well	1947	-	-	-	-	17
BoJ31-2-1	$SW_4^1SW_4^1NW_4^1$	J. V. Jackson	Becklehammer	About 1900	957	(D,S) Aban	70	2 or 3	-	-	Quicksand and gravel	-	10±	About 1900	-	-	-	-	-	-	-
BoJ31-2-2	$SE_4^1SE_4^1NW_4^1$	do.	Ed Walls	June 1919	957	D,S	145	3	143½	1½	Limestone	143½	20	June 1919	-	-	"0"	-	-	-	-
BoJ31-2-3	NW corner $NW_4^1SW_4^1$	do.	Birch Brothers	About 1944	948	S	70	4	-	-	Gravel	-	10	1944	-	-	-	-	-	-	-
BoJ33-1	$SE_4^1NW_4^1$	John W. Kernodle	Flem Boyd	About 1942	950	D,S	110	3±	(60) 105	(2) 5	(Gravel) Gravel	-	-	-	-	-	-	-	-	-	1
BoJ33-2	$NW_4^1NE_4^1$	Claud Williams	do.	-	941	D,S	80	-	10	70	Sand	-	-	-	-	-	-	-	-	-	-
BoJ34-1	$NW_4^1NE_4^1$	Omer Green	-	Before 1930	975	D	30	36	-	-	Probably gravel	-	-	-	"Good"	Up to present	-	-	1	-	-
BoK2-1	$NE_4^1NW_4^1$	Arthur Wullner	Amos Huston	1914	957	D,S	150	2	-	-	Gravel	-	16	-	do	do.	-	-	-	-	-
BoK3-1	SE corner $NE_4^1NE_4^1$	W. J. Metzger	-	-	976	D,S	132	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoK3-2	$SW_4^1SW_4^1$	L. O. Slagle	-	-	969	D,S	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoK3-3	$SE_4^1SW_4^1$	Glenn Scott	-	-	976	D,S	187	2	-	-	-	-	-	-	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana—Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F.)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoK4-1-1	NE¼NE¼	Wilbur Whitehead	--	--	957	D,S	25m	36	--	--		-	3.00	Apr. 17 1947	-	-	-	-	-	-	-
BoK4-1-2	Nr corner NE¼NE¼	do.	Seth Agan	-	957	-	400±	-	-	-	-	330	--	--	-	-	-	-	-	-	1,17
BoK4-2	NW¼NW¼NE¼	J. R. McCann	-	-	960	D,S	130	--	-	--	-	--	12	About 1945	Good	Up to present	--	-	-	-	--
BoK5-1	E½NE¼NE¼	do.	-	-	942	D,S	124	4	--	--	-	-	12	do.	-	--	-	-	-	-	1
BoK5-2	NW¼NW¼	V. R. Stark	-	-	937	S Aban	12r 8m	24±	-	-	-	--	2.15	Feb. 13 1947	-	-	-	-	-	-	-
BoK5-3-1	SW¼SW¼NW¼	Boone Co. Farm	-	--	956	(S) Aban	95m	4	-	--	Probably gravel	-	16.34	Apr. 21 1947	-	-	-	-	-	-	--
BoK5-3-2	SW¼NW¼SW¼	do.	-	-	952	S	--	4	--	--	-	--	11.30	do.	-	-	-	-	-	-	-
BoK5-3-3	SW¼NW¼SW¼	do.	Flem Boyd	--	946	D	185	3±	-	--	Fine sand	--	-	-	--	-	--	-	-	-	-
BoK5-3-4	Near center SE¼SW¼	Boone Co. Farm (C.C.C. Camp)	do.	About 1935	946	(D) Aban	(180) 37	3 to 2	33	4	Sand	180?	4.68	Apr. 18 1947	-	-	-	-	-	-	17
BoK5-3-5	Near center SE¼SW¼	do.	Clyde Kersey	--	946	(D) Aban	135	6	120	15	Gravel	135?	-	-	50	Original	--	-	-	-	1
BoK5-4-1	SE¼SW¼SW¼	Raymond Lawler (Hollingsworth)	Shopstone Hillis	1910	940	D,S	180	5-5/8	--	-	-	180?	12	About 1945	-	-	-	-	-	-	-
BoK5-4-2	E½W½NE¼	Raymond Lawler (D. T. Moore)	Ollie J. Titus	1948	940	D,S	(300 or 350) 200m	4	--	-	Sand and gravel	300 or 350	15.45	Apr. 18 1947	-	-	--	-	-	-	10 or 11
BoK6-1	*E. side S. Meridian St. Lebanon	Ed Piercol	Flem Boyd	1914	951	D	80	2	(60 or 70) 70 or 80	(10) 10+	(Sand) Gravel	-	10±	1914	10	1914	--	-	-	-	-
BoK6-2-1	0.1 mi. S. of Lebanon on S.E. St. Road	Joseph Tyre	do.	About 1907	947	D,S	190	3	180	10	do.	--	?	-	-	-	-	-	-	-	--
BoK6-2-2	0.04 mi. S. of Lebanon on S.E. St. Road	do.	do.	--	948	(S) Aban	215	3 to 2	205	10	do.	-	28	When drilled	-	-	--	-	-	-	--
BoK6-3	Near center SE¼ 1 mi. SSE. of Lebanon	Boone Co. Farm	do.	About 1930	948±	S	85 or 185	4	80±	5±	do.	--	--	-	Good well	About 1930	-	-	-	-	-
BoK6-4	S. side E. Noble St., ½ way between East St. and U. S. 52, Lebanon	Paul R. Tamer	Seth Agan	About 1915	945±	-	250	?	243±	7±	Sand, Gravel and limestone debris	--	--	--	-	-	-	-	-	-	1,4 (243)

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F.)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoK6-5	E. Side S. end of Beck St., Lebanon	Virgil Metzger	-	-	950±	D	30±	1¼	-	-	Probably gravel	-	6±	About 1947	-	-	-	-	-	-	-
BoK6-6	W. side S. Meridian St., Lebanon	-	Flem Boyd	About 1925	951	(D) Aban	92±	-	90	2±	Fine sand	-	10±	About 1925	-	-	-	-	-	-	-
BoK7-1-1	N½SE¼NE¼	H. O. Walker	-	Long ago	952	D, Little use	18m	30±	-	-	Probably gravel	-	3.32	Apr.22, 1947	-	-	-	-	-	-	-
BoK7-1-2	N½SE¼NE¼	do.	Flem Boyd	1941	952	D,S Irr.	156	3	-	-	Gravel	-	25	1941 or 1946	-	-	65	-	-	-	-
BoK7-2	E½NW¼	O. E. Haflin	do.	About 1941	950	D,S	165	3	155	10	do.	-	27±	1941	-	-	-	-	-	-	-
BoK8-1-1	SE¼SW¼NE¼	Raymond Lawler	-	1915 or 1920	944	(D) Aban	35	2½ to 1¼	-	-	do.	-	3.14	Apr.18, 1947	Low	1915 to 1920	-	-	-	-	-
BoK8-1-2	SE¼SW¼NE¼	do.	Herb Lamb	About 1945	944	D,S	235	4	-	-	-	-	17 to 20	1945 or 1947	-	-	-	-	-	-	-
BoK8-2	NE¼SE¼	Woody Green	-	Long ago	952±	D,S	46±	-	16	40?	Gravel	-	-	-	-	-	-	-	-	-	-
BoK9-1	Near center NE¼NE¼	Claud Williams	Harold Lister	1945	951	D,S	135	4	124	11	do.	-	19±	About 1945	-	-	-	-	-	-	-
BoK11-1-1	SE¼SE¼SE¼	Ollie Kimball	-	-	953	D (Little use)	107	3	-	-	Probably gravel	-	17±	1947	-	-	-	-	-	-	-
BoK11-1-2	SE¼SE¼SE¼	do.	-	About 1917	953	D,S	107	4	-	-	do.	-	17	1947	-	-	40 to 50	-	-	-	-
BoK11-1-3	SE corner SE¼SE¼	do.	-	About 1900	950	S Little use	40	4	-	-	-	-	9.30	Apr.22, 1947	-	-	-	-	-	-	-
BoK16-1-1	SE¼NW¼NW¼	Eli Ward	Flem Boyd	-	942	S	68m	3	-	-	Gravel	-	2.91	Apr.21, 1947	-	-	-	-	-	-	-
BoK16-1-2	NE corner SW¼NW¼	do.	do.	-	948	D,S	125±	4	122±	3±	do.	-	30	About 1945	-	-	-	-	-	-	-
BoK16-1-3	NE¼SE¼NE¼	do.	-	-	948±	S	21	30±	-	-	-	-	8	1947	-	-	-	-	-	-	-
BoK17-1	"3 miles south of Lebanon"	-	Kamp Lomax	-	950±	-	361	-	-	-	-	354	-	-	-	-	-	-	-	-	1,17
BoK18-1	NE¼NE¼NE¼	Clarence Sutphin	-	-	956	S	19.3	1¼	-	-	-	-	2.60	Apr.22, 1947	-	-	-	-	-	-	-
BoK18-2	NW¼NW¼NW¼	Harry Kenneman	-	-	968	D,S	87	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoK18-3-1	SE tip SW¼NW¼	Seth Agan	Seth Agan	About 1912	956	(D,S) Aban	110	2±	100	10	Gravel	-	4±	About 1912	-	-	-	-	-	-	1
BoK18-3-2	SE tip SW¼NW¼	do.	do.	About 1915	956	D,S	197	2	195	2	Limestone	195	16±	About 1915	-	-	-	-	-	-	1

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoK18-4-1	NE¼NE¼SW¼	Walter Murphy	Flem Boyd	1907	957	S	125	3	120±	5±	Sand and gravel	-	15	1907	-	-	-	-	-	-	-
BoK18-4-2	NE¼NW¼SE¼	do.	do.	1946	958	D,S	190	3	180	10	Limestone	180	20	1946	-	-	-	-	-	-	-
BoK20-1	SE¼SW¼	J. A. Sutphin	-	-	953	D,S	117	2	-	-	-	-	13.0	About 1945	-	-	-	-	-	-	-
BoK22-1	SW¼NE¼	Verlyn Hine	Earl Merritt	About 1945	956	D,S	153	4	-	-	Gravel	-	23	do.	-	-	1/3	40 5	-	-	-
BoK25-1	SW¼NE¼SE¼	E. E. Smith	-	Long ago	927	D,S	35	24±	-	-	do.	-	10±	1947	-	-	-	-	-	-	-
BoK27-1	"3/4 mi. N. of Perry Central Sch."	-	Flem Boyd	-	950±	-	130	-	(60) 126±	4±	(Sand) Gravel	130	-	-	-	-	-	-	-	-	4(126), 11
BoK27-2	NW¼NE¼	Walter Dinsmore	do.	-	950	D,S	146	-	106	47	Sand	-	10	-	-	-	-	-	-	-	4(103 to 153)
BoK27-3-1	SW¼SW¼	Tyner Bowen	do.	-	958	-	250	-	(160)	(4)	(Sand)	250	-	-	-	-	-	-	-	-	11,17
BoK27-3-2	SW¼SW¼	do.	do.	-	958	-	160	-	160	4	Sand and gravel	-	-	-	-	-	-	-	-	-	-
BoK28-1	NE¼NE¼	Mr. Howard	do.	Spring 1946	960	D,S	99	-	87?	12?	Limestone	87?	12?	Spring 1946	-	-	-	-	-	-	-
BoK29-1	NW¼SW¼	Wiley	do.	About 1935	954	D,S	142±	-	115±	25	do.	90	8	About 1935	-	-	-	-	-	-	1
BoK30-1	"4 miles south of Lebanon"	-	do.	-	944±	-	-	-	-	-	-	200	-	-	-	-	-	-	-	-	13
BoK30-2	NE¼SE¼	Mary Lucas ?	do.	About 1935	960	D,S	300	-	230	70	Fine sand	-	28±	About 1935	-	-	-	-	-	-	2 and 4 (230 to 300)
BoK31-1	"5 miles south of Lebanon"	-	do.	-	951	-	-	-	-	-	-	60 to 100	-	-	-	-	-	-	-	-	13
BoK34-1	SW¼NE¼	Perry Central School	do.	-	947	-	61	-	58	3	Limestone	58	+	-	-	-	-	-	-	-	-
BoL2-1	SW¼SW¼	James P. New	-	-	893	D	20	1¼	16±	4±	Gravel	-	-	-	-	-	-	-	2,3	-	-
BoL2-2	SW¼NE¼NW¼	C. C. Madison	Herb Lamb	About 1939	918	D,S, Irr	186	4	(100) -	(1) -	(Gravel) Gravel	-	21	1939	-	-	-	-	-	-	-
BoL2-3	SW¼NE¼	Clark Shoemaker	Willard English	1946	934	D,S	61	4	59	2	Black gravel	-	12.30	Feb. 14, 1947	Very good well	1946	-	-	-	-	-
BoL2-4	NE¼	Mr. Robinson	Earl Merritt	About 1945	925	D	62	-	60	2	Gravel	15	-	About 1945	3-1/3	About 1945	-	-	-	-	-
BoL3-1	"At Northfield"	Section of average well	-	Before 1887	910±	-	22 to 42	-	12 to 22	10 to 20	Sand or gravel	-	-	-	-	-	-	-	-	-	1,#7
BoL3-2	NE¼SE¼	"Old School"	Flem Boyd	About 1910	910	S	65	-	-	-	Gravel	-	15	About 1910	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoL3-3	NE¼NW¼	Union Township Grade School	-	-	929	D	98±	-	-	-	-	-	-	-	Good	Up to present	-	-	-	-	-
BoL3-4	SW¼SW¼	Charles Taylor	-	-	909	D	30	-	-	-	Gravel	-	22	1946 or 1947	-	-	-	-	-	-	-
BoL3-5	NE corner SW¼NE¼	H. Y. Tinch	Earl Merritt	1946	916	D	97	4±	92±	6±	do.	-	40	1946	-	-	-	-	-	-	-
BoL3-6	SE corner NE¼SE¼	Guy Stewart	do.	Spring 1947	942	S	45m	4	35	14	do.	-	22.37	June 24 1947	-	-	-	-	-	-	-
BoL4-1	SW¼NW¼	Claude Crooks Est.	-	-	942	S	160±	4	-	-	-	-	18.29	Feb. 13 1947	-	-	-	-	-	-	-
BoL5-1	NE¼NE¼	Russell Shoemaker	-	About 1917	940	S	22m	48	-	-	Gravel	-	2.90	Apr. 3, 1947	-	-	-	-	-	-	-
BoL6-1	SE¼NW¼	R. Clinger	Clyde Kersey	1946	948	D,S	85	4	80	5	do.	-	18	1946	-	-	-	-	-	-	-
BoL7-1	NE¼NE¼	William A. Cline	Herb Lamb	About 1945	938	D,S	310	4	245	65	Limestone	200	50	-	-	-	25	8 -	-	-	1
BoL10-1-1	Near center E½NE¼	Louis Haerle	Herb Lamb or Harry Fox	1941	894	D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoL10-1-2	Near center E½NE¼	do.	Herb Lamb	1946	893	D,S	109	4	-	-	Gravel	-	47	1946	-	-	-	-	-	B.3	-
BoL11-1	SE¼SW¼	H. E. Pyatt	Earl Merritt	Summer 1946	922	D,S, Irr	166	6	160	8+	do.	-	27.63	Feb. 12, 1947	-	-	-	-	-	-	-
BoL11-2-1	SE¼SW¼	R. H. Gates	Flem Boyd	About 1920	921	D,S	164	3	-	-	Fine sand	-	30	-	-	-	-	-	-	-	6
BoL11-2-2	SE¼SW¼	do.	-	-	921	S	20 13m	24	-	-	Gravel	-	6.20	Feb. 13, 1947	-	-	-	-	-	-	-
BoL11-2-3	NE¼SW¼	do.	-	-	911	D	55±	3	-	-	-	-	-	-	-	-	-	-	-	-	-
BoL11-2-4	N end SE¼SW¼	do.	-	-	914	S	12m	-	-	-	-	-	3.34	Feb. 13, 1947	-	-	-	-	-	-	-
BoL11-3	Near center W½	Adrian S. Sluner	Herb Lamb	Sept. 1942	911	D,S, Irr	190	6?	(130) (170)	(5+) (5+)	(Sand) (Gravel)	-	25	Sept. 1942	-	-	-	-	-	-	-
BoL13-1	SE¼SW¼	Columbus Abbitt	-	-	910	-	186	-	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoL14-1	NW corner SW¼NE¼	Charles E. Davis	-	-	914	D,S	85	4	-	-	-	-	-	-	-	-	-	-	-	-	-
BoL14-2	NE¼NE¼NW¼	G. E. Hutton	Herb Lamb	Aug. 1946	920	D,S	217	4	200	17	Blue limestone	200	27	Aug. 1946	-	-	1	-	-	-	1
BoL14-3	SW¼SW¼SW¼	Paul Routh	Harry Fox	1942	861	S	102	4	101	1+	Gravel	-	+3.5+	Feb. 12 1947	-	-	-	-	-	52 Feb. 1947, 53 Aug. 1947	-
BoL15-1-1	NW corner NW¼SE¼	H. V. Wolfe	Cecil Holt	1940	908	D	115	4	110	5	do.	-	25±	1940	-	-	"0"	-	-	-	1
BoL15-1-2	SW¼SE¼	do.	Willard English	1946	909	D	135	4	-	-	-	-	15	1946	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana-Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoL16-1-1	SE¼NE¼	Dr. Seibert	-	1906	892	-	-	8	-	-	-	-	+4 to +6±	June 17 1947	±	June 17 1947	-	-	-	54± June 1947	-
BoL16-1-2	NE¼NE¼	do.	Claude Kersey	About 1942	916	D,S	185	-	-	-	-	-	10 to 15	About 1942	-	-	-	-	-	-	-
BoL17-1	NW¼SW¼	James McCann	Flem Boyd	1940	930	D,S	165	3	-	-	Gravel	-	28	1940	-	-	-	-	-	-	-
BoL18-1	S½SW¼SW¼	A. E. Mendenhall	Claude Kersey	1941	943	D,S	105	3	100±	5±	do.	-	3	1941	-	-	-	-	-	-	-
BoL18-2	SW¼SE¼	Pat Pollard	Earl Merritt	About 1945	936	D	84	-	-	-	-	-	20	About 1945	-	-	-	-	-	-	-
BoL18-3	Near center of section	-	do.	do.	933	-	82±	-	-	-	-	-	20	do.	-	-	-	-	-	-	-
BoL19-1	"In Whitestown"	-	Flem Boyd	-	936±	-	38 to 185	-	-	-	Gravel	200	-	-	-	-	-	-	-	-	10
BoL19-2-1	NE¼SW¼	Whitestown School	James Kersey	About 1939	941	(D) Aban	100±	4	-	-	"Sand"	-	-	-	Poor well	1939	-	-	-	-	-
BoL19-2-2	NE¼SW¼	do.	R. A. Holt	1941	941	D	150	6	140	10	Gravel	-	50	1941	15	1941	40	-	Good	-	1
BoL19-3	NE¼	Big Four Railroad	Noble Higer	About 1927	936	D	69	2	-	-	do.	-	18	About 1927	-	-	-	-	-	-	-
BoL19-4-1	NW¼SE¼	E. C. Scott	Flem Boyd	1946	950	-	165	3	150±	15±	Sand	-	35	1946	-	-	-	-	-	-	17
BoL19-4-2	NW¼SE¼	do.	do.	1947	950	D,S	50	3	47	6	Sand and gravel	16	16	1946	-	-	-	-	-	-	-
BoL22-1-1	SE¼SE¼	F. T. Holliday	Mr. Kersey ?	About 1934	856	Aban	40m	8	-	-	Probably gravel	-	+1.1+	Mar. 12, 1947	-	-	-	-	2	-	-
BoL22-1-2	SE¼SE¼	do.	Mr. Kersey or Harry Fox	do.	872	S	140?	4	-	-	Gravel	-	+	-	-	-	-	-	-	-	-
BoL23-1	NE¼NW¼	R. H. Joseph	Herb Lamb ?	-	879	D	135	4	-	-	Probably gravel	-	+1.5+	-	-	-	-	-	2	52 Aug. 1947	-
BoL23-2	NW¼NW¼	Hannah B. Cohen et al.	Mr. Kersey	-	858	D	100±	-	-	-	Black sand	-	+	-	-	-	-	-	-	-	-
BoL23-3-1	NE¼NE¼	Dan Presser	-	-	907	(S) Aban	25m	30±	-	-	Probably gravel	-	7.59	Mar.12, 1947	-	-	-	-	-	-	-
BoL23-3-2	NE¼NE¼	do.	Flem Boyd	1943 or 1944	907	S	215	3	210±	5±	Sand and gravel	-	37	1943 or 1944	-	-	-	-	-	-	1,6
BoL23-4	SE¼NE¼SE¼	F. T. Holliday	Harry Fox	1942	891	(S) Aban	158m	4	-	-	Probably gravel	-	30.17	Mar.12, 1947	-	-	-	-	-	-	-
BoL24-1	E½NW¼NW¼	Paul Routh	Herb Lamb ?	1944	916	S	66	3	-	-	Blue clay	-	+	1944 to 1947	-	-	-	-	-	-	-
BoL24-2	NW¼NW¼	F. T. Holliday	Harry Fox	1942	870±	(S) Aban	120±	4	-	-	-	-	4.2±	Mar.12, 1947	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown			Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)				
BoL24-3	W½E½NW¼	D. and E. Dooley	-	-	914	D,S	138	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoL24-4	E½E½NW¼	C. B. McIlvain	-	-	905	D,S	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BoL25-1-1	SW¼NW¼	Perry Mendenhall	-	-	871	S	16m	-	-	-	-	-	5.41	Mar. 12 1947	-	-	-	-	-	-	-	-
BoL25-1-2	SE¼NW¼	do.	Earl Merritt	1946	883	D	149	4	145	6	Gravel	-	48±	1946	10	1946	¼	10	4	2	-	-
BoL25-2	N½S½SW¼	On R/W Ind. St. Road 29	-	-	837	-	2±	8	-	-	Probably gravel	-	+	Perennial	-	-	-	-		-	51 Mar. 1947 52½ Aug. 1947	Spring
BoL26-1-1	NW¼NW¼	F. T. Holliday	James Kersey	About 1934	845	D,S	-	-	-	-	-	-	+	Perennial	-	-	-	-		-	-	-
BoL26-1-2	NE¼NW¼	do.	do.	do.	840±	S	175	-	-	-	Gravel	-	+	do.	-	-	-	-		-	-	-
BoL26-2	Near center W½NE¼	W. K. Moore	James Kersey and John Walton	About 1905	859	D,S	70±	2½	-	-	Probably gravel	-	3±	About 1942	-	-	-	-		-	-	-
BoL27-1-1	N½NE¼	F. T. Holliday	Mr. Kersey or Harry Fox	About 1934	876	D,S	210	8	200	10	Limestone	200	+	Perennial	-	-	-	-		-	-	-
BoL27-1-2	NE¼NE¼	do.	do.	do.	875	S	15±?	-	-	-	-	-	+1+	do.	-	-	-	-		-	-	-
BoL27-1-3	NE¼NE¼	do.	-	-	907	Aban	42m	4	-	-	-	-	19.42	Aug.21, 1947	-	-	-	-		-	-	-
BoL32-1	SE¼NE¼	Ernest Hammon	Earl Merritt	About 1945	931	D,S	58	5-5/8	52	8	Gravel	-	4±	About 1945	-	-	-	-		-	-	-
BoL34-1-1	SE corner NE¼NE¼	William E. Mohler	Cecil Holt	1945	899	-	150	4	-	-	-	150	-	-	-	-	-	-		-	-	10,17
BoL34-1-2	SE corner NE¼NE¼	do.	do.	1945	899	D,S	120	4	115	5	Sand and gravel	-	30	1945	-	-	-	-		-	-	1
BoL34-2	NW¼SE¼NW¼	V. W. Shelburne	Willard English	Fall 1946	909	D,S	60	4	-	-	Gravel	-	17±	Fall 1946	-	-	-	-		-	52½ June 1947	-
BoL34-3	NE¼NE¼	Roy Shelburne	do.	1946?	908	D,S	136±	4	-	-	do.	-	27?	1946	-	-	-	-		-	-	-
BoL36-1	NW¼SE¼	-	Earl Merritt	About 1945	883	D	45	4	-	-	do.	-	20	About 1945	-	-	-	-		-	-	-
BoL36-2	NW¼SE¼	Frank Templon	do.	do.	892	D	64	4	60	6	do.	-	25	1945	-	-	-	-		-	-	-
BoL36-3	NW¼SE¼	Mr. Starkey	do.	do.	889	D	54	4	50	6	do.	-	25	About 1945	-	-	-	-		-	-	-
BoL36-4	NW¼SE¼	-	do.	Fall 1946	897	D	62	4	58	7	do.	-	25	Fall 1946	-	-	-	-		-	-	-
BoM1-1	NW¼SE¼SW¼	Jess Pratt	-	Before 1930	957	D,S	98	6	-	-	Sand and fine gravel	-	9±	About 1942	-	-	-	-		-	-	-
BoM5-1-1	S½SW¼NW¼	Marvin Porter	Ike Bracken	"Long ago"	934	D,S	55	1½	-	-	Gravel	-	10±	July 3, 1947	-	-	-	-		-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
BoM5-1-2	N½SW¼NW¼	Marvin Porter	Ike Bracken	"Long ago"	932	S	89m	3	-	-	Rock	-	+ -	Winter, Spring, Summer, and Fall	Very good well	Up to present	20	- 8	-	-	-
BoM5-1-3	N½SW¼NW¼	do.	Willard English	About 1945	932	S	91m	4	80	11	White porous limestone	80	0.62	July 3, 1947	-	-	-	-	-	52½ July 1947	-
BoM5-2	NE corner NW¼SW¼	Herman Broshar	-	About 1917	935	D,S	110±	3	-	-	Probably bedrock	-	+1.5+	July 8, 1947	-	-	-	-	-	53± July 1947	-
BoM5-3	NE corner S½SE¼	William Courtney	-	Aug. 1907	937	D,S	66	4	65	1	Gravel	-	+1.7+	do.	-	-	-	-	-	-	1
BoM6-1	SE¼SE¼NE¼	Donald Seering	Donald Seering	About 1943	924	D,S	116	-	(45±)	-	(Sand) Bedrock	-	0	1947	-	-	-	-	3	-	-
BoM9-1	Central part S½S½	Zanith Williams	Willard English	About 1945	960±	D	74	-	72	2	Gravel	-	9±	About 1945	-	-	-	-	-	-	1
BoM9-2-1	SE¼SE¼SE¼	Eph Willis Eastes	do.	-	966	-	213	4	-	-	-	90	-	-	-	-	-	-	-	-	11-(123T) 17
BoM9-2-2	SE¼SE¼SE¼	do.	do.	-	963	(D,S) Aban	30 21m	4	28	2	Gravel	-	7.30	July 8, 1947	-	-	-	-	-	-	1
BoM9-3	W½NW¼SW¼	John Randolph	do.	1946	954	D,S	46	4	45 (98)	3 -	Sand, gravel (Sand, gravel)	-	10±	1946	-	-	-	-	-	-	17
BoM10-1	"Jamestown"	"The saw mill"	-	Before 1886	950±	Ind	90	-	40	2	Gravel	-	-	-	-	-	-	-	-	-	1,#7
BoM10-2	"Jamestown"	"The grist mill"	-	do.	940±	Ind	62	-	11	2	Sand	-	-	-	-	-	-	-	-	-	1,#7
BoM10-3	"In Jamestown"	-	-	Before 1907	930 to 950	-	-	-	- 40	- -	Gravel Limestone	40	-	-	-	-	-	-	-	-	-
BoM10-4	NE corner SE¼NW¼	Roy Chamberlin	- and Roy Holt	About 1934	967	(D) Aban	150	4	75 150	- -	Sand do.	-	-	-	Very poor well	-	-	-	-	-	2(150) 4(150) 17
BoM10-5-1	N½NW¼Sec.	H. Hoover et al.	Flem Boyd	About 1935	953	D	85	-	80±	5±	Gravel	-	-	-	-	-	-	-	-	-	-
BoM10-5-2	N½NW¼SE¼	do.	do.	About 1937	953	D	112	3	93	19	Limestone	85	10	About 1937	-	-	-	-	-	-	11(8T)
BoM10-6-1	SE¼SE¼	Town of Jamestown	G. C. Stremmel	About 1941	935	PS	56±	8	-	-	Sand and gravel	-	10	About 1941	-	-	30±	-	A	-	-
BoM10-6-2	SE¼SE¼	do.	Holt Bros.	1941	935	PS	56	10	56	4	Gravel	-	10	1941	35	1941	30	35	A	-	1
BoM10-6-3	NE corner NE¼SE¼	do.	do.	About 1942	955±	-	100	-	-	-	-	100	-	-	-	-	-	-	-	-	11,17
BoM10-6-4	SW¼SE¼SW¼	do.	do.	do.	945±	-	185	-	-	-	-	110	-	-	-	-	-	-	-	-	11-(75T) 17

Records of wells in Boone County, Indiana—Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water Temperature (°F)	Notes
BoM10-6-5	Sh¼SE¼	Town of Jamestown	Shafer	Fall 1946	930±	-	512	-	(42) (97)	(5±) (3)	(Sand and gravel) (Sand)	100	-	-	-	-	-	-	-	-	11-(412T), 1,17
BoM10-6-6	E½SE¼SE¼	do.	Roy A Holt and Sons	July 1947	931	PS	(105) 31	10	25	6	Sand and gravel	105	12	July 1947	65	July 1947	9	50 8	-	-	1,11
BoM10-7	In Jamestown on N. side of State Road 34	-	Flem Boyd	About 1930	940±	D	60	-	57±	3±	Gravel	-	7±	About 1930	Fair	-	-	-	-	-	-
BoM10-8	In Jamestown on S. side of State Road 34	-	do.	About 1935	940±	D	94±	-	92±	2±	Limestone	85±	10±	About 1935	Small	About 1935	-	-	-	-	1 11(7±T)
BoM10-9	NE corner NE¼SW¼	William Young	-	July ? 1907	953	D	98	2	-	-	Rock	-	7	About 1942	Large	Up to present	-	-	-	-	-
BoN2-1	SW¼SW¼	Harry Romine	Leonard Holt	1940	959	S	233	4	(120) 175	(5) 58	(Dirty sand) Shale	175	40	-	-	-	"0"	-	-	-	1,11
BoN2-2	S central SW¼	-	Flem Boyd	1940	960±	-	241	4	217	24	Sandstone	-	-	-	-	-	-	-	-	-	-
BoN3-1	Central W½W½W½	New Brunswick Telephone Co.	do.	About 1943	952	D	142±	2	138±	4±	Sand	-	-	-	-	-	-	-	-	-	2(138)
BoN3-2	S½S½NE¼	Horace Smith	Willard English	1946	952	D,S	165	-	164	1	Gravel	-	20	1946	-	-	-	-	-	-	1
BoN3-3	SW corner SW¼NW¼	Harry Pounds	do.	1946	952	D	146	-	142±	4±	Black gravel	-	30	1946	-	-	-	-	-	-	6
BoN4-1	NW¼SE¼	Marion Dinsmore	Flem Boyd	About 1942	944	D	(190) 165	3	160±	5±	Sand	194?	28	About 1942	-	-	-	-	-	-	1
BoN5-1-1	NW¼SE¼NE¼	W. D. Hiland	Willard English	Spring 1946	932	-	48	4	44½	3½	Gravel	-	-	-	-	-	-	-	1,2	-	17
BoN5-1-2	NW¼SE¼NE¼	do.	do.	do.	935	D	146	4	142	4	do.	-	3±	Spring 1946	Small	Up to present	20+	-	1,2	-	6,17
BoN9-1	SW¼NE¼	Oscar Nolan	-	-	955	S	20±	30	-	-	Probably gravel	-	2.10	Jan.27, 1947	-	-	-	-	-	-	-
BoN9-2	NE¼SW¼	Frank E. Randle	Flem Boyd	About 1936	959	D,S	128	2	-	-	Gravel	-	20±	About 1942	Good well	Up to present	-	-	-	-	-
BoN10-1	SW¼SE¼	Everett Dickerson	do.	About 1942	960	D,S	58	3	-	-	Gray gravel	-	10±	do.	-	-	-	-	-	-	-
BoN12-1	SW corner SE¼NE¼	E. S. Walker	George Merritt	"Years ago"	958	D,S	220	4	-	-	Gravel	-	36	do.	-	-	-	-	-	-	-
BoO1-1	SE corner NE¼SE¼	Mr. Scott	Claude Kersey	About 1942	931	D	65	3	-	-	Sand and gravel	-	10±	About 1942	-	-	-	-	-	-	-
BoO4-1	"1½ mi. NW of Fayette"	-	Flem D. Boyd	-	958	-	71	-	68	3	Limestone	68	+	When drilled	-	-	-	-	-	-	-
BoO8-1	SE¼SE¼	Donald Wolfe	Birch Bros.	1947	955	D,S	185	6	(80) 184±	- -	(Dry gravel) Gravel	-	25±	1947	-	-	-	-	-	-	-
BoO9-1-1	SE¼NE¼ S, "At White Lick"	Penn RR.	Layne-Northern Co.	Jan. 1925	953±	-	98	-	(19)	-	(Sand, gravel)	-	-	-	-	-	-	-	-	-	1,17?

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F)	Notes
BoO9-1-2	SE¼NE¼ ? "At White Lick"	Penn. RR.	Layne-Northern Co.	Jan. 1925	953±	-	77	-	(19) (65)	(8) (12)	(Sand, gravel) (Sand)	-	-	-	-	-	-	-	-	-	1,17‡
BoO9-2	S½SW¼	Dr. Brown	Earl Merritt	About 1945	955±	D,S	155±	-	150±	5±	Gravel	-	-	-	-	-	-	-	-	-	-
BoO9-3	"2 mi. NSW of Fayette"	DeWitt Brown	do.	1938 or 1939	955±	-	35±	4	-	-	Probably gravel	-	10	1938 or 1939	25	1938 or 1939	-	-	-	-	-
BoO10-1	"Whitelick"	-	-	Before 1908	945±	-	10 to 150	-	-	-	Sand and gravel	-	13	Before 1908	-	-	-	-	-	-	#4
BoO10-2	E½, "At Fayette"	-	Flem Boyd	-	943±	D	175±	-	170	5±	Limestone	170	-	-	-	-	-	-	-	-	-
BoO10-3	S½NE¼ "in north part of Fayette"	-	do.	-	947	D	65	-	60±	5±	Gravel	-	-	-	-	-	-	-	-	-	-
BoO10-4	"In vicinity of White Lick"	-	Earl Merritt	About 1945	940±	D,S	157	-	-	-	do.	-	35	About 1945	13-1/3	About 1945	-	-	-	-	-
BoP1-1-1	SE¼SW¼	Pittman-Moore Co.	C. Krauss and Sons	About 1920	860±	Ind	450±	-	210±	240±	Limestone	175±	-	-	100 45± 0	About 1920 About 1942 1946	-	-	3	-	10-(35±T), 1,
BoP1-1-2	SE¼SW¼	do.	do.	1922	853±	Ind	143	10	135±	8±	Gravel	-	40±	1922	150±	1922	-	-	-	-	-
BoP1-1-3	SE¼SW¼	do.	do.	1942	865±	Ind	160	10	155±	8±	do.	163±	40±	1942	150±	1942	-	-	-	-	10
BoP1-1-4	SE¼SW¼	do.	do.	1946	851	Ind	90	12	80	10	do.	-	30	1946	130±	1946	26	130 6±	-	-	1
BoP1-2-1	NE¼NW¼	James R. Mayfield	Herb Lamb ?	1936	876	D	-	4	-	-	do.	-	52	1936	-	-	-	-	-	-	-
BoP1-2-2	NW¼NE¼	do.	do.	1938	884	D,S	300	4	-	-	Rock	170±	50±	1938	-	-	-	-	2	-	-
BoP1-2-3	SE¼NE¼	do.	-	-	858	S	133m	2	-	-	-	-	15.57	Apr.15, 1947	-	-	-	-	-	-	-
BoP1-3-4	NW¼NE¼	do.	-	-	882	S	39m	24	-	-	Probably gravel	-	5.07	do.	-	-	-	-	-	-	-
BoP1-3	NW¼SE¼	Russel Fitch	Earl Merritt	About 1943	826	D	70	4	-	-	Gravel	-	+	Apr.29, 1947	-	- -	-	-	-	-	-
BoP2-1-1	NE¼NE¼	Zionsville Water Dept.	Flem Boyd	About 1922	840±	PS	110	6	(35±) 100	(5±) 10	(Sand, gravel) Gravel	-	+	1922	15 80	1922-flowing 1922-pumping	28	80 16	A	-	1
BoP2-1-2	NE¼NE¼	do.	C. Krauss and Sons	1937	842	PS	(150) 70	-	60	10	do.	145	-	-	75 25	1937 1939	2	-	A	-	1,10-(5‡)
BoP2-1-3	NE¼NE¼	do.	Layne-Northern Co.	Nov. 10, 1939	833	PS	(111) 74	-	47±	27±	do.	-	19	Nov.10, 1939	-	-	(1)	20 -	A	-	1
BoP3-1	SE corner NW¼NW¼	Mr. LeTourneau	Earl Merritt	About 1945	905	D,S	38	4	-	-	do.	-	15	About 1945	25	About 1945	-	-	-	-	-
BoP4-1	N½SE¼NE¼	Hollie Keune	do.	do.	924	D,S	106	4	-	-	do.	-	20	1945	-	-	-	-	-	-	-

Records of wells in Boone County, Indiana--Continued

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers			Depth to bedrock (feet)	Water level		Yield		Drawdown		Quality of water	Water temperature (°F)	Notes
									Depth to top of bed (feet)	Thickness (feet)	Materials		Above (+) or below land surface (feet)	Date	Yield (g.p.m.)	Date	Amount (feet)	Rate (g.p.m.) and Time (hr.)			
BoP5-1-1	SW¼NW¼	Bender and Lacock	Mr. Hoover	About 1910	929	-	200	-	-	-	None	200	-	-	-	-	-	-	-	-	10
BoP5-1-2	SW¼NW¼	do.	do.	do.	929	D	113	-	-	-	Sand	-	-	-	-	-	-	-	-	-	-
BoP5-2	NE¼NW¼	Chester Riner	Willard English	About 1945	922	D,S	125	-	(87) 123±	- -	(Gravel) Gravel	125	14	About 1945	-	-	-	-	-	-	11, 2(100)
BoP5-3	SW¼SE¼	Traders Point Hunt Club	Earl Merritt	do.	922	D,S	104	4	-	-	Probably gravel	-	20	do.	-	-	-	-	-	-	-
BoP5-4	NW¼SE¼SE¼	Olive Moore	Ray Lister	1947	906	D,S	85	-	-	-	Gravel	-	-	-	-	-	-	-	-	-	-
BoP6-1	SW¼SW¼	Rush Harmon	Earl Merritt	About 1945	936	D,S	86	4	82	5	Gray gravel	-	10	About 1945	50 to 65	About 1945	-	-	-	-	-
BoP6-2	NE tip NE¼SW¼	Leona Hartman	Willard English	do.	928	-	100	-	-	-	-	100	-	-	-	-	-	-	-	-	11,17
BoP7-1	SE¼, "At Royalton"	-	Flem Boyd	About 1930	930	-	22	-	-	-	Gravel	-	+	About 1930	-	-	-	-	-	-	-
BoP7-2	SE¼SE¼	-	-	About 1925	931	D,S	113	-	-	-	Fine sand	-	-	-	-	-	-	-	-	-	-
BoP7-3	SE¼SE¼	Marvel's Grocery	Claude Kersey	-	929	D	105	3	-	-	Gravel	-	13?	When drilled	-	-	-	-	-	-	-
BoP7-4	SE¼SE¼	Mr. Clige	do.	About 1942	920	D,S	129	-	(95) 127	(20) 2±	(Sand) Gravel	-	13	-	-	-	-	-	-	-	1,2- (100)
BoP7-5-1	NE¼NW¼	-	Earl Merritt	About 1945	933	-	120	4	-	-	-	115	-	-	-	-	-	-	-	-	11(5T)
BoP7-5-2	NE¼NW¼	-	do.	do.	933	D,S	40	4	35	7±	Gravel	-	8	About 1945	-	-	-	-	-	-	-
BoP8-1	"On E. side of US Highway 52 on Boone Co. line	-	Clyde and Claude Kersey	-	880±	D	140	8	132	8	do.	-	+	When drilled	-	-	-	-	-	-	-
BoP9-1	SE¼SE¼SW¼	T. A. Ressler, Jr.	Earl Merritt	About 1945	912	D,S	97	6	-	-	Probably gravel	-	12±	About 1945	-	-	-	-	-	-	-
BoP11-1	SW¼SW¼	James Roberts	do.	do.	841	D,S	104	8	96	10	Gray gravel	-	42±	do.	-	-	-	-	-	-	-
BoP12-1	"SE corner of Boone Co."	Mr. Williams	do.	do.	896	D	160	-	118	42	Sand and gravel	165?	40	do.	-	-	-	-	-	-	2(118)

Records of wells in Hamilton and Hendricks Counties, Indiana

Well No.	Location	Owner	Driller	Date completed	Altitude of land surface, in feet above mean sea level	Use	Depth (feet)	Diameter (inches)	Aquifers: Depth to top of bed (feet)	Aquifers: Thickness (feet)	Aquifers: Materials	Depth to bedrock (feet)	Water level: Above (+) or below land surface (feet)	Water level: Date	Yield: Yield (g.p.m.)	Yield: Date	Drawdown: Amount (feet)	Drawdown: Rate (g.p.m.) and Time (hr.)	Quality of water	Water temperature (°F.)	Notes
HAMILTON COUNTY:																					
HaK30-1	SW¼NW¼	Mr. Riggs	Earl Merritt	1947	920±	D,S	142	4	120	22	Limestone	120	20	1947	Low	1947	-	-	-	-	-
HaK31-1	"Jollietville"	Leeran Blain	W. R. Moss, Sr.	About 1946	923±	D	235	4	216	19	do.	216	37	About 1946	-	-	-	-	-	-	-
HaM7-1	SW¼SW¼	-	Earl Merritt	About 1945	887	D	182	4	180	2	do.	180	40	About 1945	-	-	-	-	-	-	-
HaM7-2	SW¼SW¼	-	do.	do.	887	D	63	4	58±	8±	Gravel	-	18	do.	33-1/3	About 1945	-	-	-	-	-
HENDRICKS COUNTY:																					
HdA14-1	NE¼NW¼NW¼	Ohio Oil Co.	Clyde Kersey	About 1935	927	(Ind) Abdn	110	12	95	15?	do.	-	-	-	Poor well	About 1935	-	-	-	-	17
HdA16-1-1	NE corner NW¼NE¼	Eph Willis Eastes	-	-	963		200±	-	(58) (85) (125)	- - -	Probably gravel	130	-	-	-	-	-	-	-	-	11 or 12(70?), 17
HdA16-1-2	NE corner NW¼NE¼	do.	Earl Merritt	About 1945	963	D,S	58	4	-	-	Sand and gravel	-	10±	About 1945	20	About 1945	-	-	-	-	-
HdB13-1	SE corner NW¼NE¼	Leiner Wolfe	Willard English	do.	968	D,S	203	-	(65) 202	(1) 1	(Sand) Black gravel	-	18±	do.	-	-	-	-	-	-	1
HdC16-1	NW¼NW¼NW¼	Vern Wolfe	Birch Bros.	1946	955	D,S	80	5	-	-	Gray gravel	-	20	1946	20	1946	-	-	-	-	-

APPENDIX B

LOGS OF WELLS IN BOONE COUNTY, INDIANA

Note

Information in some of the logs is taken from published reports, as indicated by quotation marks and references in parentheses. The remaining logs were obtained from well drillers in the area.

G-Bo??-1 "At Lebanon" (12, p.44)

	Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Drift	210	210
Blue and black shales	204	414
Limestones	401	815
Shale	412	1,227
Trenton limestone	373	1,600

G-Bo??-2 "Lebanon, Indiana, gas well" (10, p.16; 11, p.99)

Soil, black	2	2
Till, yellow (Wisconsin)	9	11
Till, blue, becoming gray toward bottom	15	26
Sand, with water	2	28
Till, ash-colored, soft and sticky (probably Wisconsin)	77	105
Gravel	8	113
Till, pale, ash-colored, hard and dry (probably Illinoian)	53	166
Till, dark ash or gray, with some sand interbedded (probably Illinoian, if not older)	176	342
Shale	108	450
Limestone	Great thickness	

Leverett "examined a set of samples of drift taken from a gas boring at Lebanon which was of much service in interpreting records in the neighboring districts, and he has little doubt that the change from soft to hard till marks the passage from Wisconsin to pre-Wisconsin drift."

G-Bo??-3 "4½ miles northeast of Lebanon" (10, p.17; 11, p.102)

Log of drift is similar to that of G-Bo??-2

G-Bo??-4 "At Thorntown" (4, p.74; 6, p.263; 12, p.45)

Drift	65	65
Subcarboniferous limestone and shale	238	303
Hamilton shale	87	390
Corniferous limestone	37	427
Niagara limestone	407	834
Hudson River and Utica	373	1,207
Trenton limestone	80	1,287

G-Bo??-7 "At Zionsville" (12, p.44)

	Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Drift	160	160
Black shale	75	235
Devonian limestone with sandstones at base	75	310
Lower Helderberg and water lime	50	360
Niagara limestone	165	525
Clinton limestone	30	555
Hudson River and Utica	525	1,080
Trenton limestone	33	1,113

G-Bo??-8 "At Zionsville" (11, p.100)

Sand and gravel with a little clay	30	30
Gravel, coarse	8	38
Till, blue	50±	88±
Till, yellow and blue, in alternate beds containing pieces of wood	60±	148±
Boulder, large	7	155
Clay, yellow	10	165

"The yellow till at 88 feet may mark the passage from the Wisconsin to the Illinoian till though its low altitude rather favors the view that it is in the midst of pre-Wisconsin drift. The well is in the valley of Eagle Creek and may start at a level as low as the base of the Wisconsin." (11, p.100)

BoE?-11 "Short distance north of Dover" (7, p.173)

Soil	1	1
Yellow clay	6	7
Blue clay	15	22
Gravel	½	22½

RoH?-12 "3 miles southeast of Elizaville, on the Michigan Road" (7, p.169; 10, p.15; 11, p.99)

Soil and yellow clay	18	18
Quicksand	3	21
Blue clay	20	41
White fine sand with gas	11	52
Blue clay	6	58
Swamp muck, leaves, twigs, etc.	7	65
Blue clay	19	84

Gas at 41 feet flowed strongly for a short time.

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoL?-16	"2½ miles north of Jamestown" (7, p.167; 11, p.99)		
	Soil	2	2
	Yellow clay and sand	28	30
	Quicksand	2	32
	Blue clay	29	61
	Black muck, leaves, twigs and branches of trees	3	64
	Sand and clay	12	76
	Siliceous shale - "Soapstone"	160	236
BoI?-17	"Jackson Township, 4 miles north of Jamestown" (7, pp.166-167; 11, p.98)		
	Soil and yellow clay, mixed with sand	12	12
	Yellow sand	2	14
	Hard gravel	4	18
	Hardpan-gravel	4	22
	White sand	6	28
	Sand and clay, bluish	18	46
	Black muck or loam, with branches of trees and other vegetable matter	12	58
	Blue clay	4	62
	Gray sand, gravel, etc.	26	88
Bo??-19	"Well on Washington St., in Lebanon" (7, p.170; 10, p.16; 11, p.100)		
	Soil	7	7
	Yellow sand	1	8
	Yellow clay	3	11
	Bluish sand and clay	1	12
	Sand	4	16
	Blue clay	3	19
	Sand and gravel	4	23
	Blue clay	2	25
	Gray clay	3	28
	Hardpan-indurated clay	4	32
	Blue (laminated) clay	14	46
	Gray clay	3	49
	Sand and clay	10	59
	Blue clay	23	82
	Coarse gravel	1	83
	Blue clay	25	108
Bo??-20	"5 miles west of Lebanon" (7, p.169; 10, p.17; 11, p.103)		
	Soil and yellow clay	17	17
	White quicksand	5	22
	Blue clay	51	73
	Dry gravel - gas seam	5	78
	Blue clay	165	243

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Bo??-21	"6 miles west of Lebanon" (7, p.167)		
	Soil	2	2
	Blue clay (containing 5-inch walnut branch)	11	13
	Sand	5	18
Bo??-22	"6 miles south of Lebanon" (7, p.173; 10, p.15; 11, p.99)		
	Soil	2	2
	Yellow clay	18	20
	Blue clay	45	65
	Swamp muck, leaves, twigs, etc.	10	75
	Blue clay	25	100
	Sandstone	9	109
BoN?-24	"Average section of wells at New Brunswick" (7, p.173)		
	Soil	1 to 2	1 to 2
	Yellow clay or gravel	5 to 10	6 to 12
	Sand and gravel	1 to 3	7 to 15
	Blue clay	4 to 20	11 to 35
Bo??-28	"At Royalton" (7, p.172; 10, p.17)		
	Soil	$3\frac{1}{2}$	$3\frac{1}{2}$
	Yellow clay	17	$20\frac{1}{2}$
	Gravel	5	$25\frac{1}{2}$
	Blue clay with frequent thin layers of sand and gravel	$70\frac{1}{2}$	96
BoP?-29	"In Royalton, in Fishback Valley" (11, p.102)		
	Blue clay	$25\pm$	$25\pm$
	Gravel	5	$30\pm$
	Blue clay	$70\pm$	$100\pm$
BoH?-30	"Slabtown" (7, p.171)		
	Soil	2	2
	Blue clay	30	32
	Gravel	$\frac{1}{2}$	$32\frac{1}{2}$
	Blue clay	14	$46\frac{1}{2}$
Bo??-31	"At Thorntown" (Driller's log) (7, p.168; 10, p.14)		
	Soil	2	2
	Yellow clay	19	21
	Quicksand	4	25
	Blue clay (cedar tree at 100 feet)	125	150
	Siliceous snale - "soapstone"	193	343

Bo??-31 "At Thorntown" (Mill Engineer's log) (7, p.168)

	Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Soil	2	2
Yellow clay	13	15
Gravel	3	18
Blue clay	82	100
Cedar tree		
Blue clay	37	137
"Soapstone"	60	197
Gray limestone	136	333

Bo??-34 "1 mile west of Thorntown" (7, p.174; 10, p.15; 11, p.103)

Soil and yellow clay	25	25
Quicksand	3	28
Blue clay	80	108

Bo??-36 "3½ miles west of Lebanon" (7, p.175; 11, p.103)

Soil and yellow clay	18	18
Fine white sand	55	73
Blue clay	71	144
Limestone	3	147

BoF?-37 "1 mile south of Thorntown" (7, p.174; 10, p. 14; 11, p.103)

Soil and yellow clay	19	19
Quicksand	4	23
Blue clay	103	126
Cemented gravel	6	132

BoA?-38 and BoA?-39 "3 miles north of Thorntown" (7, p.173; 10, p.14; 11, p.103)

Soil and yellow clay	18	18
Quicksand 12	30	
Blue clay 153½	183½	
Red sandstone 3½	187	

Bo B?-42 "3 miles east of Thorntown, near Union Church" (7, p.175; 10, p.14; 11, p.103)

Soil and yellow clay	27	27
Quicksand	9	36
Blue clay	75	111

Bo??-45 "Average of wells at Zionsville" (7, p.172)

Soil	2	2
Yellow clay	10	12
Blue clay	4 to 10	16 to 22
Gravel	1 to 3	17 to 25
Blue clay	20 to 40	37 to 65

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoA35-1-4	"At Thorntown"		
	Drift	103	103
	Gravel (hard water)	10	113
	Mostly blue clay	87	200
	Shale (no water)	300	500
	Limestone (no water)	200	700
	Shale (no water)	65	765
BoA35-2	"In Thorntown"		
	Clay	30	30
	Sand	5	35
	Blue clay	10	45
	Sand and dry gravel	10	55
	Blue clay	20	75
	Fine sand	3	78
	Gravel and sand	10	88
BoC33-1-1	"3 miles west of Elizaville"		
	Blue clay	60	60
	Sand	15±	75±
	Gravel	5±	80
BoF13-1	"2 miles north of Lebanon on Frankfort Road"		
	Soil	2	2
	Yellow clay	7	9
	Gravel and sand	2	11
	Blue clay	22	33
	Gravel	2	35
	Gravel and clay	3	38
	Blue clay	50	88
	Boulder	1	89
	Blue clay	23	112
BoF14-1	"3½ miles northwest of Lebanon"		
	Yellow clay	47	47
	Black gravel	3	50
BoF18-1			
	Yellow clay	103	103
	Gravel	2	105
BoF24-3-1			
	Drift, consisting mainly of yellow clay	109	109
	Blue shale or soapstone	121	230

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoF26-2-2	"½ mile northwest of Lebanon"		
	Drift	115	115
	Gravel	5	120
	Clay, blue	3	123
	Gravel	5	128
	Shale	48	176
	Clay, gray, hard	40	216
	Gravel	6	222
	Shale, blue, "sticky"	8	230
	Sand, multicolored, fine to medium with gravel (?)	1	231
	It is believed that the sand reported at 231 feet came from 6-foot gravel unit above the shale at 222 feet.		
BoF34-8	"2½ miles west of Lebanon"		
	Blue clay	70½	70½
	Black gravel	3½	74
BoF36-1-11	"Lebanon waterworks field"		
	Soil) Clay , Gravel)	43	43
	Stiff clay	54	97
	Gravel , Stiff clay	125	222
	Gravel	8	230
	Blue shale	97	327
	Limestone	7	334
	Black shale	75	409
	Limestone ("last, or bottom, 16 feet is soft")	407	816
BoF36-3-1	"In western part of Lebanon"		
	Clay	130	130
	Sand	10	140
	Shale	60	200
BoF36-6	"In western part of Lebanon"		
	Clay	20	20
	Hardpan	25	45
	Mud, blue	15	60
	Sand	5	65
	Clay	10	75
	Sand, water bearing	20	95
	Hardpan	6	101
	Sand, white dry	6	107

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoF36-7	"In southwest Lebanon"		
	Hardpan	70±	70±
	Sand and gravel	5±	75±
	Hardpan	50±	125±
BoG4-1			
	Blue clay	...	...
	Quicksand	...	...
	Hardpan	...	...
	Boulders	...	...
	Hardpan	...	201
	Gray gravel	10	211
BoG4-2-1			
	Blue clay	60	60
	Sand	15±	75±
	Gravel	5±	80
BoG4-2-2			
	Blue clay	...	...
	Much hardpan	...	230
	Gray gravel	5	235
BoG5-1			
	Yellow clay	...	...
	Blue clay	...	...
	Quicksand	...	...
	Hardpan	...	313½
	Fine sand and gravel	½	314
	Limestone	...	...
BoG5-2			
	Yellow clay	...	...
	Blue clay	...	...
	Quicksand	...	...
	Mud bed	...	...
	Hardpan	...	135
	Gravel	5	140
BoG8-1			
	Blue clay	...	...
	Sand strip	...	...
	Hardpan	...	300
	Gray gravel	4	304

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoG8-2-2			
	Yellow clay	110	110
	Blue clay	3	113
	Black gravel	2	115
BoG9-1			
	Yellow clay	...	...
	Blue clay	...	...
	Quicksand	...	...
	Hardpan	...	100
	Gravel	5	105
BoG9-2			
	Blue clay	...	...
	Sand	...	...
	Boulders, etc.	...	156
	Gray gravel	4	160
BoG31-4-1			
	Clay	40	40
	Fine sand	10	50
	Sand, gravel, and clay	100	150
	Gravel	6	156
BoG32-1			
	Top soil	14	14
	Clay	36	50
	Green gravel	8	58
BoG33-2			
	Top soil	6	6
	Blue clay	24	30
	Boulders, rocks, sand, gravel, clay	10	40
	Blue clay	12	52±
	Sand and gravel	5±	57
BoH31-2-1			
	Drift (mostly blue clay)	82	82
	Muck	8	90
	Gravel	2±	92
	Drift	118±	210±
	New Albany black shale	90	300
	Hard white limestone	93	393

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoH31-2-2			
	Blue clay	57	57
	Sand	2	59
	Gravel	2	61
BoH33-1			
	Top soil	6	6
	Blue clay	24	30
	Hardpan and yellow clay	121	151
	Sand	4	155
BoH34-1			
	Soil	1½	1½
	Red clay	8	9½
	Sand and gravel	1 to 10	10½ to 19½

G-BoH34-2

"Marshall, Henry A., #1, 300 feet from N. line, 150 feet from W. line, in NW¼NE¼ sec. 34 T. 19 N., R. 2 E. Completed August 21, 1940 by N. N. Smith, et al. Elevation 942 feet. Dry hole."

Clay and hardpan	69	69
Gravel, water	5	74
Clay, rocky	102	176
Sand, fine	11	187
Clay, red	10	197
Slate, black	18	215
Limestone, water	67	282
Shale with layers of stone	101	383
Lime, soft	40	423
Lime, hard	92	515
Lime, soft, gritty, water	47	562
Shale, blue	19	581
Lime, dark, soft	16	597
Shale, blue and lime	190	787
Shale, brown	261	1,048
Lime, hard: Trenton, some gas at 1,146 feet. Est. 5,000 cu. ft. 24 hr.; 10 gal. per hr. salt water at 1,150 feet	94	1,142
Lime, soft	7	1,149
Lime, hard	73	1,222
Shale, blue	2	1,224
Lime, brown, hard	31	1,255
Lime, white	11	1,266
Lime, hard	48	1,314
Lime, medium	68	1,382

B-BoH34-2 (cont'd)	Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Lime, soft	57	1,439
Lime, hard	83	1,522
Slate and shale	62	1,584
Sandstone, St. Peter, mineral water	16	1,600
Sandstone, white, hard	225	1,825

Casing record: 8-inch to 199 feet, 6-5/8-inch to 580 feet.

BoH34-4

Yellow clay	40	40
Blue clay	50	90
Black gravel	5	95

BoI18-1-4

Drift	50±	50±
White rock	...	...
Blue rock	...	90±

BoI22-1

Drift	30	30±
Shale	1 to 2	31 to 32
Limestone	3 to 4	34 to 36

BoI23-3-1

Yellow clay	5	5
Blue clay	10	15
Sand	1	16
Blue clay	12	28
Gravel	10	38

BoJ1-3-1

Top soil	6	6
Clay	7	13
Clay and boulders	39	52
Sand	2	54
Clay and boulders	12	66
Sand and gravel	14	80
Gravel and boulders	60	140
Clay	5	145
Sand, gravel, boulders	10	155
Hardpan	5	160
Sand, gravel, boulders	15	175
Sand and cemented gravel	14	189

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoJ12-2			
	Yellow clay	5	5
	Blue clay	90	95
	Sand	1	96
	Blue clay	154	250
	Gravel	3	253
BoJ12-3			
	Drift (mostly blue clay with some sand and gravel)	225	225
	Sand and gravel with gas	5	230
	Blue clay	30	260
	Sand	6±	266±
	Blue clay	10±	276±
	Gravel (?)	5±	281±
	Limestone	1±	282±
	Shale		
BoJ26-1	"Average section of wells at Milledgeville"		
	Soil	1 to 2	1 to 2
	Yellow clay or gravel	5 to 10	6 to 12
	Gravel and sand	1 to 10	7 to 22
	Blue clay	5 to 20	12 to 42
BoJ33-1			
	Top soil	6±	6±
	Blue clay	54±	60±
	Gravel	2	62
	Blue clay	43	105
	Gravel	5	110
BoK4-1-2			
	Drift	330±	330±
	Limestone	20±	350±
	Black shale	50±	400±
BoK5-1			
	Top soil	...	...
	Blue clay	...	...
	Hardpan	...	...
	Gravel	...	124

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoK5-3-5			
	Clay	30	30
	Sand, no water	10	40
	Blue clay	80	120
	Gravel, water bearing	15	135
	Blue shale	..	...
BoK6-4			
	Till, with sand and gravel layers	243±	243±
	Limestone debris and gravel	2±	245±
	Sand (and gravel)	5±	250±
	Limestone	...	...
BoK17-1			
	Drift with some sand and gravel layers	354	354
	Limestone, no water	7	361
	Shale	...	...
BoK18-3-1			
	Hardpan	100	100
	Gravel	10	110
BoK18-3-2			
	Hardpan	195±	195±
	Limestone	2±	197±
BoK29-1			
	Drift	90	90
	Limestone, alternating blue and gray, pretty hard	50	140
	Blue shale	2±	142±
BoL3-1	"Section of average well at Northfield		
	Soil	2	2
	Yellow clay	10 to 20	12 to 22
	Sand or gravel	10 to 20	22 to 42
BoL7-1			
	Drift	200	200
	Shale	45	245
	Limestone	65	310

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
PoL14-2			
	Yellow and red clay	9	9
	Blue clay	181	190
	Quicksand	10	200
	Limestone, blue	17	217
BoL14-3			
	Gravel	12 to 18	12 to 18
	Blue clay	89 to 83	101
	Gravel, red oak bark at base	1	102
PoL15-1-1			
	Hard, sandy clay	110	110
	Gravel	5	115
BoL19-2-2			
	Blue clay	140	140
	Gravel	10	150
BoL23-3-2			
	Blue clay and other drift	100	100
	Yellow clay and other drift	110+	210+
	Sand and gravel	5±	215±
PoL34-1-2			
	Clay	10	10
	Sand	2	12
	Blue clay	60	72
	Sand	1	73
	Blue clay	42	115
	Sand and gravel	5	120
BoM5-3			
	Sand	9+	9+
	Blue clay	56−	65−
	Coarse gray gravel	1	66
BoM9-1			
	Yellow clay	67+	67+
	Tough blue clay	5±	72±
	Gravel	2−	74±
BoM9-2-2			
	Blue clay	28	28
	Gravel	2	30

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BomlO-1			
	Soil	3	3
	Yellow clay	8	11
	Quicksand	1	12
	Blue clay	28	40
	Gravel	2	42
	Blue clay	48	90
BoMlO-2			
	Soil	1	1
	Yellow clay	10	11
	Sand	2	13
	Blue clay	49	62
BoMlO-6-2			
	Blue clay	52	52
	Gravel	4	56
BoMlO-6-5			
	Blue clay	42±	42±
	Sand (and gravel)	5±	47±
	Till (blue clay)	50±	97
	Sand	3±	100
	Soft blue shale	412	512
BoMlO-6-6			
	Fill	2	2
	Clay	7	9
	Hardpan	16	25
	Gravel	6	31
	Hardpan	9	40
	Gravel	2	42
	Muddy sand	8	50
	Hardpan	55	105
	Blue shale		
BoMlO-8			
	Drift	85±	85±
	Shale, becoming harder with depth	7±	92±
	Limestone, not so hard	2±	94±
BoN2-1			
	Blue clay	120	120
	Dirty sand	5	125
	Blue clay	50	175
	Shale	58	233

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoN3-2			
	Clay and sand	150	150
	Blue clay	14	164
	Gravel	1	165
BoN4-1			
	Blue clay with sand, gravel, etc.	160	160
	Fine sand	5	165
	Blue clay	20	185
	Red dirt ("clay")	5	190
	Driller believes that lime stone underlies the unit above		
BoO9-1-1			
	Cinders, dirt, clay	19	19
	Sand and gravel with layers of clay	61	80
	Red clay	10	90
	Blue clay	8	98
BoO9-1-2			
	Clay, yellow	19	19
	Sand and gravel	8	27
	Sand and clay mixed	33	60
	Rock	5	65
	Coarse sand	12	77
BoP1-1-1			
	Drift	175±	175±
	Shale	35±	210±
	Limestone	240±	450±
BoP1-1-4			
	Fill	7	7
	Dry gravel	5	12
	Blue clay	53	65
	Yellow clay	15	80
	Water gravel	10	90
	Hardpan		
BoP2-1-1			
	Clay	35±	35±
	Sand and gravel	5±	40±
	Clay	60±	100
	Gravel	10	110

Another version of the log of this hole follows:

		Thickness of stratum (feet)	Depth to bottom of stratum (feet)
BoP2-1-1 (cont'd)			
	Top soil	3	3
	Gravel	85	88
	Hardpan	18	106
	Gravel	7±	113
BoP2-1-2T			
	Soil and yellow, dirty gravel	15	15
	Dry gravel	12	27
	Fine gray sand	10	37
	Hardpan	3	40
	Yellow water gravel	10	50
	Coarse gray water sand	5	55
	Water gravel	5	60
	Good water gravel	10	70
	Blue clay	60	130
	Fine sand	10	140
	Blue clay	5	145
	Shale	5	150
BoP2-1-3T			
	Fill and clay	10	10
	Gravel	36	46
	Gravel, fine sand mixed	9	55
	Gravel	21	76
	Clay	23	99
	Sand, fine muddy	4	103
	Sand, fine	8	111
BoP2-1-3			
	Fill and clay	4	4
	Gravel, fine, dry	5	9
	Clay, sandy	2	11
	Gravel, dirty	8	19
	Gravel, clean, fine	13	32
	Gravel, coarse	14	46
	Boulders	1	47
	Gravel and sand	27	74
BoP7-4			
	Till	95	95
	Sand, with 4½-foot log at 100 feet	20	115
	Till	12	127
	Gravel	2	129

HdB13-1

	Thickness of stratum (feet)	Depth to bottom of stratum (feet)
Blue clay	65	65
Sand	1	66
Yellow hardpan	136	202
Black gravel	1	203

APPENDIX C

CHEMICAL ANALYSES OF GROUND WATERS OF BOONE COUNTY, INDIANA

Notes

All those analyses made by H. E. Barnard (Indiana State Board of Health) and Chase Palmer (U. S. Geological Survey) are from Capps' report (4).

I.S.B.H. indicates analyses were made by members of the Indiana State Board of Health.

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
ADVANCE									
BoI23-1	90	Limestone	H.E. Barnard	1907	0.01	-	61	25	-
BoI23-3-1	38	Gravel	I.S.B.H.	Oct.3, 1946	10.	-	-	-	-
BoI23-3-2	35	Sand and gravel	do.	May 7, 1947	5.0	0.0	-	-	-
JAMESTOWN									
BoM10-6-1 and 2	56	do.	do.	About 1942	2.0	-	-	-	-
BoM10-6-1 or 2	56	do.	do.	June 18,1946	1.2	-	-	-	-
BoM10-6-1 and 2	56	do.	do.	do.	1.2	-	-	-	-
LEBANON									
BoF36-1-11?	230	Gravel	Chase Palmer	1907	2.3	-	78	37	99
BoF36-1-6	97	do.	do.	do.	0.4	-	53	30	31
All pumping municipal wells	53, 104, and 225±	do.	I.S.B.H.	Sept.23,1932	0.5	0.1	-	-	-
Do.	do.	do.	do.	Jan.31,1934	2.0	-	-	-	-
Do.	do.	do.	Grover Tank Co.	Aug.14,1934	3.25	-	98.8	31.8	60.9
Do.	do.	do.	International Filter Co.	Aug.15,1934	1.4	-	-	144	141

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate CO_3	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F.)
ADVANCE											
BoI23-1	-	0.0	366	0.0	16	-	-	-	412	-	-
BoI23-3-1	-	-	-	-	1	-	400	354	-	7.7	-
BoI23-3-2	-	-	-	-	1	1.4	370	338	-	8.1	-
JAMESTOWN											
BoM10-6-1 and 2	-	-	-	-	8	-	328	258	-	7.8	-
BoM10-6-1 or 2	-	-	-	-	1	-	356	265	-	7.9	-
BoM10-6-1 and 2	-	-	-	-	1	-	350	269	-	7.5	-
LEBANON											
BoF36-1-11 ?	-	24	564	1.6	4.2	-	-	-	622	-	-
BoF36-1-6	-	14	301	3.6	2.5	-	-	-	352	-	-
All pumping municipal wells	24	-	-	-	12	-	296	322	-	7.2	-
Do.	18	-	-	-	11	-	382	-	-	7.7	51.8
Do.	9.9?	-	-	-	13.34	-	-	511	791	7.1	-
Do.	-	-	-	-	-	-	394	374	512	7.2	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
LEBANON (cont.)									
BoF36-1-4	47	Gravel	I.S.B.H.	Apr.11, 1935	1.5	-	-	-	-
BoF36-1-5	59	do.	do.	do.	8.0	-	-	-	-
BoF36-1-6	104	do.	do.	do.	0.7	-	-	-	-
BoF36-1-10	220	do.	do.	do.	5.0	-	-	-	-
BoF36-1-1	104	do.	do.	Sept.14,1935	0.5	-	-	-	-
BoF36-1-2	53	do.	do.	do.	8.0	-	-	-	-
BoF36-1-3	104	do.	do.	do.	1.0	-	-	-	-
BoF36-1-4	47	do.	do.	do.	0.8	-	-	-	-
BoF36-1-5	59	do.	do.	do.	3.0	-	-	-	-
BoF36-1-6	104	do.	do.	do.	0.6	-	-	-	-
BoF36-1-8	104	do.	do.	do.	0.8	-	-	-	-
BoF36-1-"9"	105 or 224 ?	do.	do.	do.	2.5	-	-	-	-
BoF36-1-10	220	do.	do.	do.	1.2	-	-	-	-
All pumping municipal wells (water from raw-water reservoir)	50±, 104± and 225±	do.	do.	Jan. 3,1936	1.8	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F.)
LEBANON (Cont.)											
BoF36-1-4	28	-	-	-	13	-	376	494	-	7.2	55.4
BoF36-1-5	41	-	-	-	15	-	366	446	-	7.3	57.2
BoF36-1-6	11	-	-	-	5	-	354	316	-	7.4	57.2
BoF36-1-10	38	-	-	-	2	-	524	336	-	7.4	53.6
BoF36-1-1	-	-	-	-	-	-	334	280	-	-	-
BoF36-1-2	-	-	-	-	-	-	378	322	-	-	-
BoF36-1-3	-	-	-	-	-	-	366	350	-	-	-
BoF36-1-4	-	-	-	-	-	-	374	482	-	-	-
BoF36-1-5	-	-	-	-	-	-	374	478	-	-	-
BoF36-1-6	-	-	-	-	-	-	358	324	-	-	-
BoF36-1-8	-	-	-	-	-	-	362	346	-	-	-
BoF36-1-"9"	-	-	-	-	-	-	330	416	-	-	-
BoF36-1-10	-	-	-	-	-	-	554	368	-	-	-
All pumping municipal wells (water from raw-water reservoir)	-	-	-	-	-	-	344	-	-	7.5	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
LEBANON (Cont.)									
All pumping municipal wells (water from raw-water reservoir)	50±, 104±, and 225±	Gravel	I.S.B.H.	Feb.25, 1936	2.0	-	-	-	-
Do.	do.	do.	do.	Mar.25, 1936	1.3	-	-	-	-
Do.	do.	do.	do.	Apr.22, 1936	1.2	-	-	-	-
Do.	do.	do.	do.	June 9, 1936	1.2	-	-	-	-
Do.	do.	do.	do.	Nov.13, 1936	1.2	-	-	-	-
Do.	do.	do.	do.	Dec.30, 1936	1.0	-	-	-	-
Do.	do.	do.	do.	Feb. 2, 1937	1.5	-	-	-	-
Do.	do.	do.	do.	Apr. 7, 1937	0.8	-	-	-	-
Do.	do.	do.	do.	May 5, 1937	1.2	-	-	-	-
Do.	do.	do.	do.	Dec.21, 1937	1.3	-	-	-	-
Do.	do.	do.	do.	Feb.24, 1938	1.8	-	-	-	-
Do.	do.	do.	do.	Apr.28, 1938	2.0	-	-	-	-
Do.	do.	do.	do.	May 2, 1938	3.0	-	-	-	-
Do.	do.	do.	do.	Oct.25, 1938	1.5	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F.)
LEBANON (Cont.)											
All pumping municipal wells (water from raw-water reservoir)	-	-	-	-	-	-	364	-	-	7.4	-
Do.	-	-	-	-	-	-	390	-	-	7.4	-
Do.	-	-	-	-	-	-	374	-	-	7.5	-
Do.	-	-	-	-	-	-	382	-	-	7.5	-
Do.	-	-	-	-	-	-	358	-	-	7.6	-
Do.	-	-	-	-	-	-	344	-	-	7.6	-
Do.	-	-	-	-	-	-	344	-	-	7.6	-
Do.	-	-	-	-	-	-	350	-	-	7.6	-
Do.	-	-	-	-	-	-	376	-	-	7.4	-
Do.	-	-	-	-	-	-	348	-	-	7.4	-
Do.	-	-	-	-	-	-	352	-	-	7.5	-
Do.	24	-	-	-	-	-	374	446	-	7.4	-
Do.	-	-	-	-	-	-	374	-	-	7.3	-
Do.	-	-	-	-	-	-	384	-	-	7.5	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
LEBANON (Cont.)									
All pumping municipal wells (water from raw-water reservoir)	50±,104± and 225±	Gravel	I.S.B.H.	Jan. 2, 1939	1.2	-	-	-	-
Do.	do.	do.	do.	Mar.28, 1939	1.5	-	-	-	-
Do.	do.	do.	do.	Nov. 8, 1939	1.6	-	-	-	-
Do.	do.	do.	do.	Mar. 7, 1940	1.2	-	-	-	-
Do.	do.	do.	do.	May 22, 1940	1.6	-	-	-	-
Do.	do.	do.	do.	Oct.29, 1940	1.2	-	-	-	-
Do.	do.	do.	do.	Jan.22, 1941	0.9	-	-	-	-
Do.	do.	do.	do.	Apr.15, 1941	1.4	-	-	-	-
Do.	do.	do.	do.	Nov.18, 1941	1.2	-	-	-	-
Do.	do.	do.	do.	Apr. 7, 1942	1.4	-	-	-	-
Do.	do.	do.	do.	June 26,1942	1.6	-	-	-	-
Do.	do.	do.	do.	Oct. 7, 1942	1.2	-	-	-	-
Do.	do.	do.	do.	Oct.20, 1943	1.2	-	-	-	-
Do.	do.	do.	do.	Jan.22, 1946	0.9	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp ($^oF.$)
LEBANON (Cont.)											
All pumping municipal wells (water from raw-water reservoir)	-	-	-	-	-	-	374	-	-	7.9	-
Do.	-	-	-	-	-	-	378	434	-	7.5	-
Do.	-	-	-	-	-	-	374	-	-	7.4	-
Do.	-	-	-	-	-	-	358	415	-	7.5	-
Do.	-	-	-	-	-	-	372	384	-	7.5	-
Do.	-	-	-	-	-	-	396	372	-	7.4	-
Do.	-	-	-	-	-	-	388	360	-	7.5	-
Do.	-	-	-	-	-	-	392	384	-	7.4	-
Do.	-	-	-	-	-	-	350	396	-	7.8	-
Do.	-	-	-	-	-	-	388	-	-	7.8	-
Do.	-	-	-	-	-	-	376	408	-	7.7	-
Do.	-	-	-	-	-	-	380	432	-	7.6	-
Do.	-	-	-	-	-	-	406	448	-	7.7	-
Do.	-	-	-	-	-	-	356	298	-	7.9	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
LEBANON (Cont.)									
All pumping municipal wells (water from raw-water reservoir)	50±, 104± and 225±	Gravel	I.S.B.H.	Apr.16, 1947	2.0	-	-	-	-
THORNTOWN									
C-Bo??-33	90	do.	Chase Palmer	1907	1.0	-	67	28	50
Bo-A35-1-5 or 6	70±	do.	I.S.B.H.	Feb.2, 1931	1.4	-	-	-	-
Do.	do.	do.	do.	do.	6.0	-	-	-	-
Do.	do.	do.	do.	Jan.31, 1934	1.5	-	-	-	-
Do.	do.	do.	do.	do.	2.3	-	-	-	-
Do.	do.	do.	do.	Aug.16, 1934	2.5	-	-	-	-
Do.	do.	do.	do.	do.	1.5	-	-	-	-
Do.	do.	do.	do.	Apr. 2, 1936	0.0	-	-	-	-
Do.	do.	do.	do.	do.	1.0	-	-	-	-
Do.	do.	do.	do.	Sept.2,1936	1.5	-	-	-	-
Do.	do.	do.	do.	do.	2.3	-	-	-	-
Do.	do.	do.	do.	Nov. 6, 1937	2.5	-	-	-	-
Do.	do.	do.	do.	do.	2.5	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate CO_3	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F)
LEBANON (Cont.)											
All pumping municipal wells (water from raw-water reservoir)	-	-	-	-	-	-	384	303	-	8.2	-
THORNTOWN											
G-Bo??-33	-	7.2	378	9.5	12	-	-	-	390	-	-
BoA35-1-5 or 6	-	-	-	-	28	-	388	-	-	-	-
Do.	-	-	-	-	30	-	388	-	-	-	-
Do.	-	-	-	-	27	-	382	-	-	-	-
Do.	16	-	-	-	29	-	376	418	-	7.2	51.8
Do.	14	-	-	-	27	-	378	410	-	7.2	53.6
Do.	-	-	-	-	27	-	382	-	-	7.4	-
Do.	14	-	-	-	26	-	386	406	-	7.2	51.8
Do.	-	-	-	-	27	-	390	-	-	7.4	-
Do.	14	-	-	-	26	-	386	414	-	7.3	53.6
Do.	-	-	-	-	26	-	384	-	-	7.5	-
Do.	13	-	-	-	26	-	384	418	-	7.5	53.6
Do.	11	-	-	-	27	-	390	444	-	7.6	53.6

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potassium (Na+K)
BcA35-1-5 or.6	70	Gravel	I.S.B.H.	Nov. 6, 1937	2.5	-	-	-	-
Do.	do.	do.	do.	Apr.27, 1938	2.5	-	-	-	-
Do.	do.	do.	do.	do.	4.0	-	-	-	-
Do.	do.	do.	do.	Jan.24, 1939	1.6	-	-	-	-
Do.	do.	do.	do.	do.	2.0	-	-	-	-
Do.	do.	do.	do.	Apr.11, 1940	1.6	-	-	-	-
Do.	do.	do.	do.	do.	9.6 ?	-	-	-	-
Do.	do.	do.	do.	do.	2.4	-	-	-	-
Do.	do.	do.	do.	July 30,1940	1.6	-	-	-	-
Do.	do.	do.	do.	do.	1.6	-	-	-	-
Do.	do.	do.	do.	do.	3.0	-	-	-	-
Do.	do.	do.	do.	Feb.14, 1942	1.8	-	-	-	-
Do.	do.	do.	do.	do.	1.9	-	-	-	-
Do.	do.	do.	do.	Dec.23, 1943	1.5	-	-	-	-
Do.	do.	do.	do.	do.	1.7	-	-	-	-
Do.	do.	do.	do.	Sept.20,1946	2.6	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F)
BoA35-1-5 or 6	-	-	-	-	28	-	392	-	-	7.6	-
Do.	-	-	-	-	29	-	406	444	-	7.2	-
Do.	-	-	-	-	28	0.6	420	-	585	7.4	-
Do.	35	-	-	-	25	-	406	488	-	7.3	52
Do.	-	-	-	-	25	-	408	-	-	7.3	-
Do.	-	-	-	-	23	-	384	-	-	7.4	-
Do.	-	-	-	-	25	-	388	-	-	7.4	-
Do.	-	-	-	-	24	-	382	-	-	7.5	-
Do.	-	-	-	-	19	-	388	-	-	7.3	-
Do.	-	-	-	-	21	-	388	-	-	7.3	-
Do.	-	-	-	-	21	-	392	-	-	7.4	-
Do.	-	-	-	-	15	-	374	374	-	7.9	-
Do.	-	-	-	-	16	-	372	-	-	7.7	-
Do.	-	-	-	-	6	-	322	364	-	8.1	-
Do.	-	-	-	-	4	-	332	-	-	8.0	-
Do.	-	-	-	-	14	-	406	380	-	7.1	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
THORNTOWN (Cont.)									
BoA35-1-5 or 6	70	Gravel	I.S.B.H.	Sept.20, 1946	1.75	-	-	-	-
Do.	do.	do.	do.	Mar. 17, 1946	1.5	-	-	-	-
WHITESTOWN									
BoL?-44	105	do.	H.E. Barnard	1907	1.2	-	64	27	-
ZIONSVILLE									
Bo??-46	108	do.	do.	do.	0.01	-	114	35	-
Zionsville Water and Electric Co.	-	-	-	do.	4.4a/	-	96	22	14
Public Well	"Open well"	Till	H.E. Barnard	do.	0.4	-	49	28	-
BoP2-1-1	110 or 140	Gravel	I.S.B.H.	Oct.10, 1930	0.2	-	-	-	-
Do.	do.	do.	do.	Apr.18, 1932	0.6	-	-	-	-
Do.	do.	do.	do.	Aug.14, 1934	0.3	-	-	-	-
Do.	do.	do.	do.	June 11,1936	0.5	-	-	-	-
Do.	do.	do.	do.	Aug. 3, 1936	0.3	-	-	-	-
BoP2-1-2	70	do.	do.	July 12,1937	11.0 ?	-	-	-	-
Do.	do.	do.	do.	Oct. 9, 1937	2.5	-	-	-	-

a/ Iron and aluminum

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F.)
THORNTOWN (Cont.)											
Bo?35-1-5 or 6	-	-	-	-	15	-	408	411	-	7.1	-
Do.	-	-	-	-	2	0.3	404	383	-	7.2	-
WHITESTOWN											
Bo??-44	-	0.0	451	0.0	12	-	-	-	512	-	-
ZIONSVILLE											
Bo??-46	-	0.0	345	120	112	-	-	-	754	-	-
Zionsville Water and Electric Co.	-	163	-	57	22	-	-	-	432	-	-
Public well	-	0.0	388	0.0	32	-	-	-	454	-	-
BoP2-1-1	-	-	-	-	18	-	430	-	-	-	-
Do.	-	-	-	-	14	-	390	-	-	7.4	-
Do.	11	-	-	-	14	-	334	324	-	7.4	53.6
Do.	9	-	-	-	21	-	364	294	-	7.5	-
Do.	-	-	-	-	14	-	312	318	-	7.6	-
BoP2-1-2	-	-	-	-	70	-	356	378	-	7.7	-
Do.	-	-	-	-	23	-	394	454	-	7.5	-

(Parts per million, except pH)

Well No. or owner	Depth (feet)	Aquifer	Analyst	Date of collection	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and Potasium (Na+K)
ZIONSVILLE (Cont.)									
BoP2-1-2	70	Gravel	I.S.B.H.	Jan.13, 1938	2.0	-	-	-	-
Do.	do.	do.	do.	Mar.21, 1938	2.0	-	-	-	-
Do.	do.	do.	do.	June 21,1938	2.0	-	-	-	-
Do.	do.	do.	do.	Nov.30, 1938	3.0	-	-	-	-
Do.	do.	do.	do.	do.	1.5	-	-	-	-
Do.	do.	do.	do.	Jan.16, 1939	2.5	-	-	-	-
BoP2-1-3	74	do.	do.	Oct.31, 1939	1.7	-	-	-	-
Do.	do.	do.	do.	do.	2.2	-	-	-	-
Do.	do.	do.	do.	Jan.28, 1943	0.8	-	-	-	-
Do.	do.	do.	do.	Aug.18, 1944	1.2	-	-	-	-
Do.	do.	do.	do.	Jan. 5, 1945	1.3	-	-	-	-
Do.	do.	do.	do.	Sept.20, 1946	1.0	-	-	-	-

(Parts per million, except pH)

Well No. or owner	Free CO_2	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Alkalinity as $CaCO_3$	Total hardness	Dissolved solids	pH	Temp (°F.)
ZIONSVILLE (Cont.)											
BoP2-1-2	13	-	-	-	26	-	380	410	-	7.1	51.8
Do.	-	-	-	-	26	-	360	424	-	7.6	-
Do.	45	-	-	-	28	-	388	444	-	7.4	53.6
Do.	53	-	-	-	27	-	376	457	-	7.3	54
Do.	-	-	-	-	15	-	148	73 ?	-	9.0	-
Do.	38	-	-	-	15	-	384	521	-	7.2	54
BoP2-1-3	-	-	-	-	11	-	334	328	328	7.5	-
Do.	-	-	-	-	23	-	374	448	-	7.3	-
Do.	-	-	-	-	9	-	296	368	-	7.4	-
Do.	-	-	-	-	11	-	302	392	-	7.7	-
Do.	-	-	-	-	3	-	278	348	-	8.0	-
Do.	-	-	-	-	0 ?	-	316	388	-	7.1	-

APPENDIX D

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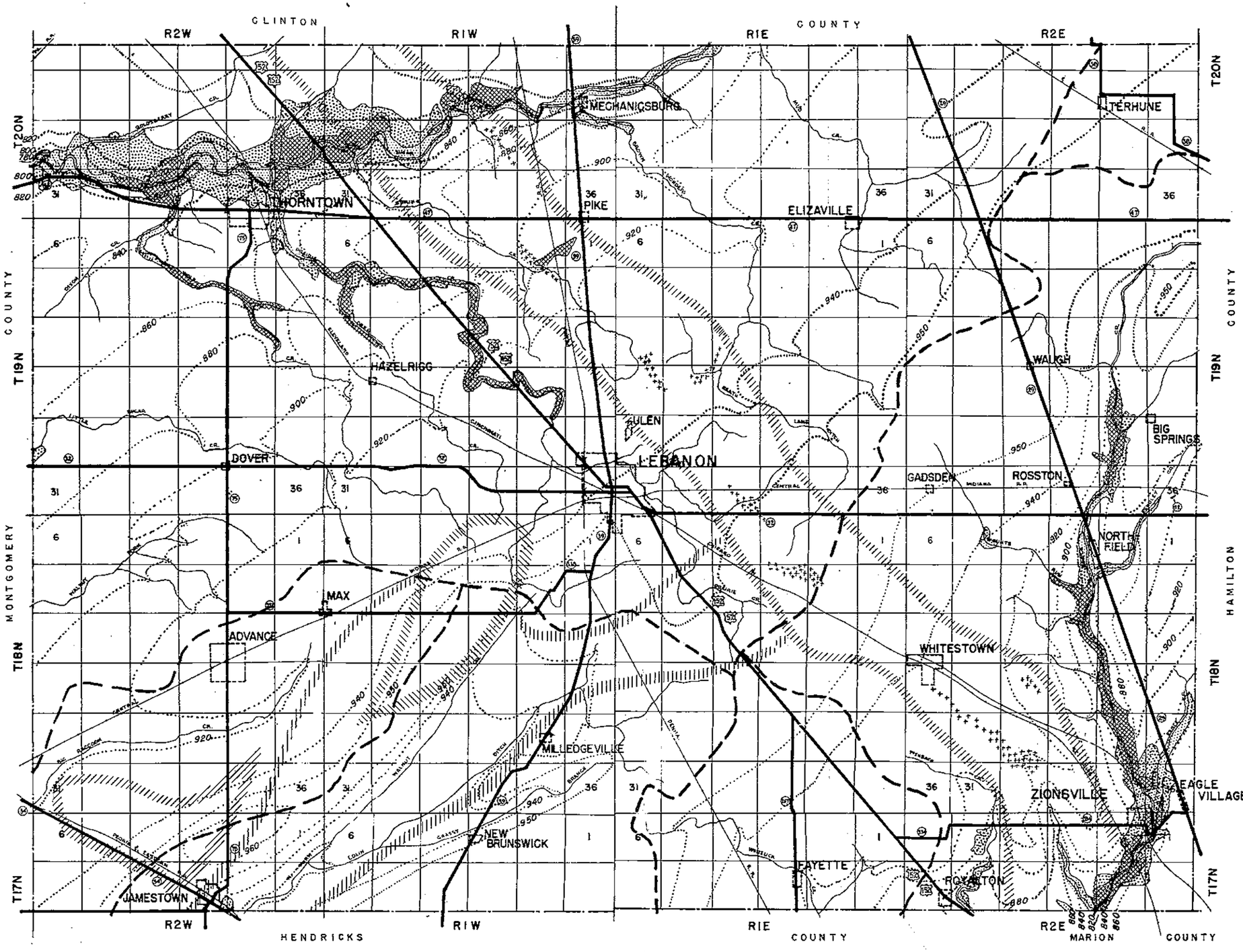


EXPLANATION

- DRAINAGE DIVIDE
- GENERALIZED SURFACE CONTOURS BASED ON ELEVATIONS OF BENCH MARKS ESTABLISHED BY U.S. COAST AND GEODETIC SURVEY. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL.
- AREA OF MORAINAL HILLS.
- BOUNDARY OF MORAINE DEPOSITED ON LAND.
- BOUNDARY OF MORAINE DEPOSITED IN WATER.
- BOUNDARY OF SLUICEWAY OF LEVERETT.
- AREA OF FOX SILT LOAM AND FOX SANDY LOAM SOILS, WHICH ARE NORMALLY DEVELOPED ON WISCONSIN OUTWASH DEPOSITS OF SAND AND GRAVEL. THESE SOILS USUALLY INDICATE OUTWASH TERRACE REMNANTS OR VALLEY TRAINS.
- AREA OF GENESEE SANDY LOAM SOIL, WHICH IS GENERALLY DEVELOPED ON ALLUVIAL SAND AND GRAVEL. THIS SOIL INDICATES RECENT ALLUVIUM.
- AREA OF GENESEE LOAM AND GENESEE SILT LOAM SOILS, WHICH ARE GENERALLY DEVELOPED ON ALLUVIAL COARSE SANDS AND FINE GRAVELS. THESE SOILS INDICATE RECENT ALLUVIUM.

DRAINAGE-DIVIDE DATA TAKEN FROM BOONE CO. DRAINAGE MAP BY INDIANA DEPT. CONS., DIV. ENG., DATED 1923, REVISED 1924 AND 1937.

GEOLOGY BY FRANK LEVERETT(11) AND W. D. THORNBURY.

SOIL DATA TAKEN FROM "SOIL SURVEY OF BOONE CO., INDIANA," U.S. DEPT. AGR., 1914.

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIAGRAM OF TOWNSHIP

MAP OF
BOONE COUNTY, INDIANA
SHOWING SURFACE DRAINAGE, SURFICIAL GEOLOGY, AND GENERALIZED CONTOURS OF LAND SURFACE

0 1 2 3 4 5 6 MI.

0 5,000 10,000 15,000 20,000 FT.

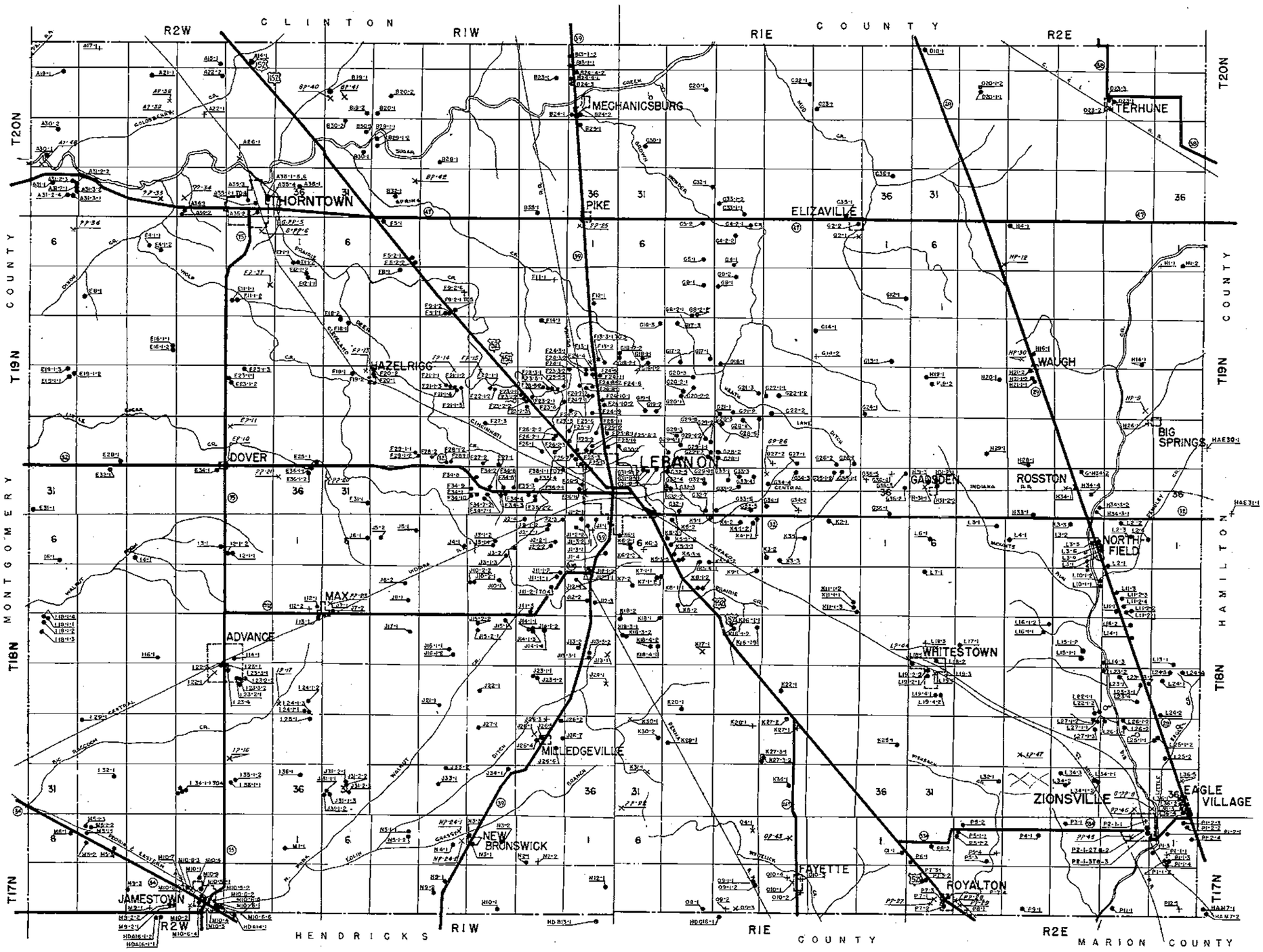
	R2W	R1W	R1E	R2E
T20N	A	B	C	D
T19N	E	F	G	H
T18N	I	J	K	L
T17N	M	N	O	P

LETTER DESIGNATION OF TOWNSHIPS IN WELL-NUMBERING SYSTEM

BASE FROM POST OFFICE RURAL DELIVERY MAP OF BOONE COUNTY

INDIANA DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



EXPLANATION

WELL LOCATION

- Definite
- \+ Indefinite
- × General
- ♀ SPRING

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIAGRAM OF TOWNSHIP

MAP OF
BOONE COUNTY, INDIANA
SHOWING LOCATIONS OF WELLS

0 1 2 3 4 5 6 MI.

0 5,000 10,000 15,000 20,000 FT.

	R2W	RIW	RIE	R2E
T20N	A	B	C	D
T19N	E	F	G	H
T18N	I	J	K	L
T17N	M	N	O	P

LETTER DESIGNATION OF TOWNSHIPS IN WELL-NUMBERING SYSTEM

BASE FROM POST OFFICE RURAL DELIVERY MAP OF BOONE COUNTY

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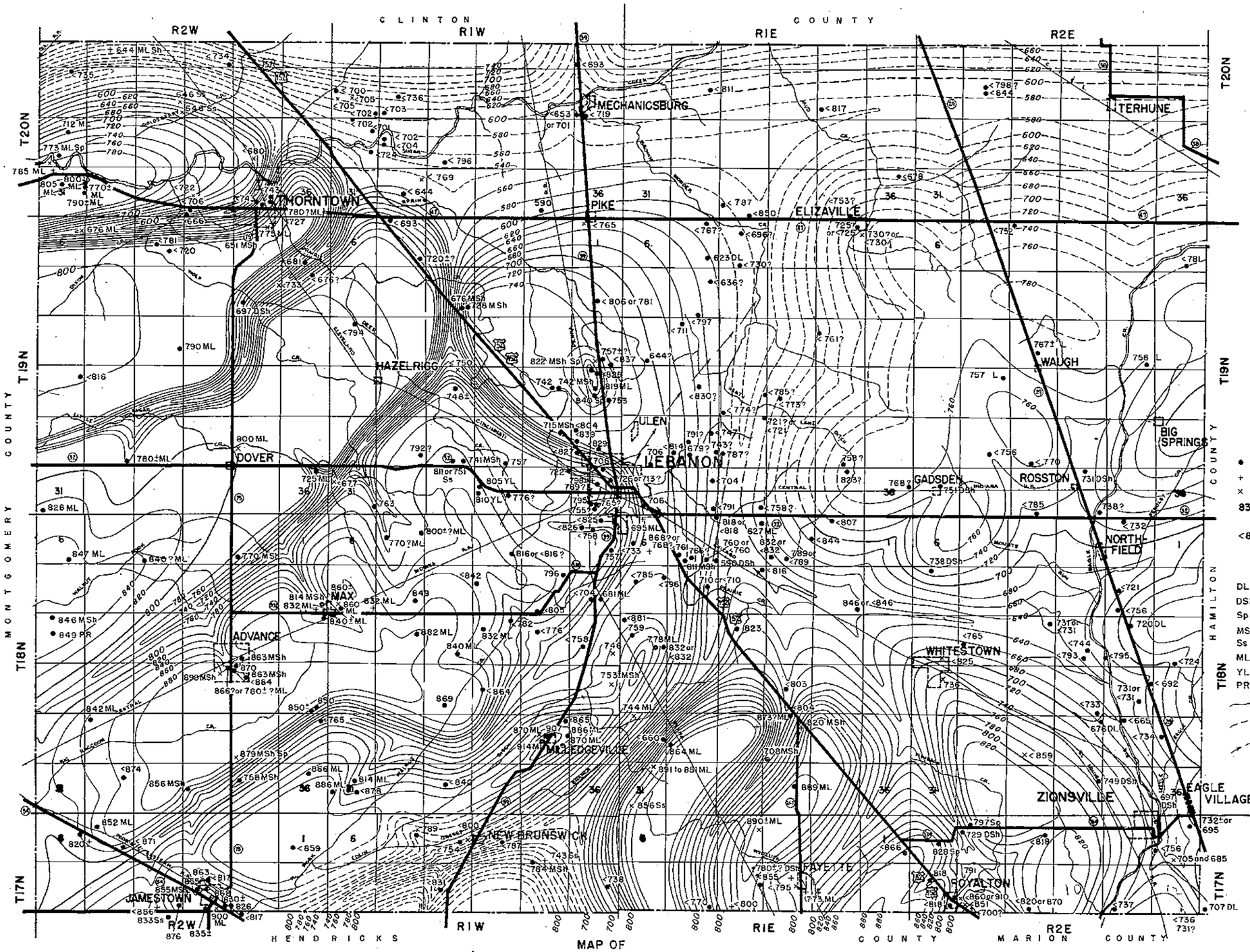

EXPLANATION

WELL LOCATION
- ● Definite
- \+ Indefinite
- × General

838 ELEVATION OF BEDROCK SURFACE, IN FEET ABOVE MEAN SEA LEVEL

<838 ELEVATION OF BEDROCK SURFACE IS LESS THAN 838 FEET ABOVE MEAN SEA LEVEL

TYPES OF BEDROCK AT BEDROCK SURFACE
- DL Limestone
- DSh Black shale
- Sp Soapstone
- MSh Shale
- Ss Sandstone
- ML Limestone, white, blue, or grey
- YL Limestone, yellow
- PR Porous rock

CONTOURS ON BEDROCK SURFACE

CONTOURS ON BEDROCK SURFACE QUESTIONABLE

POSSIBLE BEDROCK DRAINAGE LINE

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIAGRAM OF TOWNSHIP

MAP OF

BOONE COUNTY, INDIANA

SHOWING

BEDROCK TOPOGRAPHY AND LITHOLOGY

0 1 2 3 4 5 6 MI.

0 5,000 10,000 15,000 20,000 FT.

SCALE

CONTOUR INTERVAL 20 FEET

	R2W	R1W	R1E	R2E
T20N	A	B	C	D
T19N	E	F	G	H
T18N	I	J	K	L
	M	N	O	P
T17N				

LETTER DESIGNATION OF TOWNSHIPS IN WELL-NUMBERING SYSTEM

BASE FROM POST OFFICE RURAL DELIVERY MAP OF BOONE COUNTY

INDIANA DEPARTMENT OF CONSERVATION
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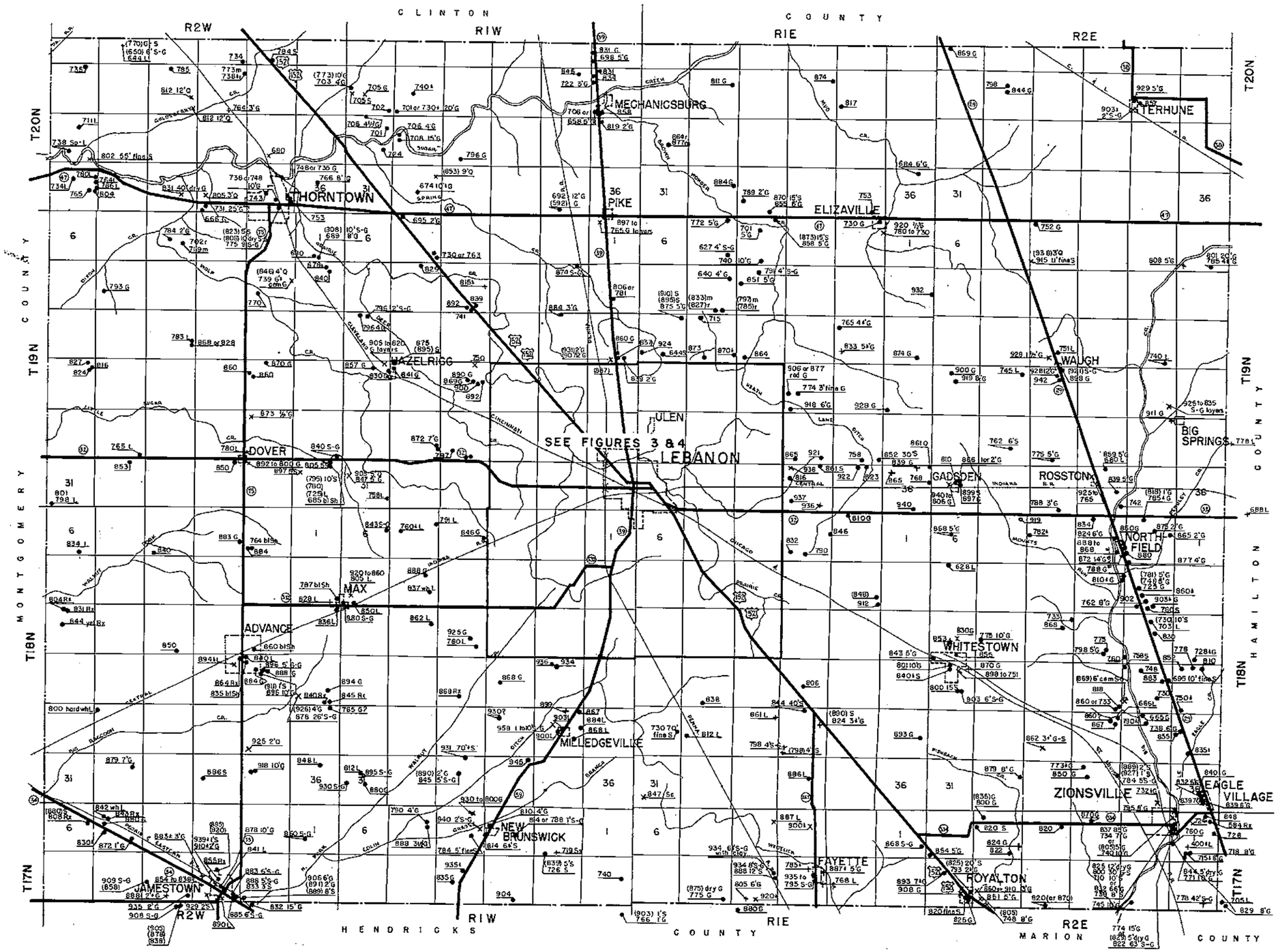

EXPLANATION

WELL LOCATION

- ● Definite
- \+ Indefinite
- × General

929 5'G ELEVATION, IN FEET ABOVE SEA LEVEL, OF TOP OF PRINCIPAL AQUIFER, THICKNESS AND TYPE OF AQUIFER

(895) ELEVATION, IN FEET ABOVE SEA LEVEL, OF TOP OF MINOR OR UNUSED AQUIFER

G- Gravel	cem - cemented
S- Sand	m - measured
Q- Quicksand	r - reported
L- Limestone	bl - blue
Sh- Shale	wh - white
Ss- Sandstone	yel - yellow
Rx- Bedrock	

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIAGRAM OF TOWNSHIP

MAP OF BOONE COUNTY, INDIANA

SHOWING DATA ON AQUIFERS

0 1 2 3 4 5 6 MI.

0 5,000 10,000 15,000 20,000 FT.

	R2W	R1W	R1E	R2E
T20N	A	B	C	D
T19N	E	F	G	H
T18N	I	J	K	L
T17N	M	N	O	P

LETTER DESIGNATION OF TOWNSHIPS IN WELL-NUMBERING SYSTEM

BASE FROM POST OFFICE RURAL DELIVERY MAP OF BOONE COUNTY

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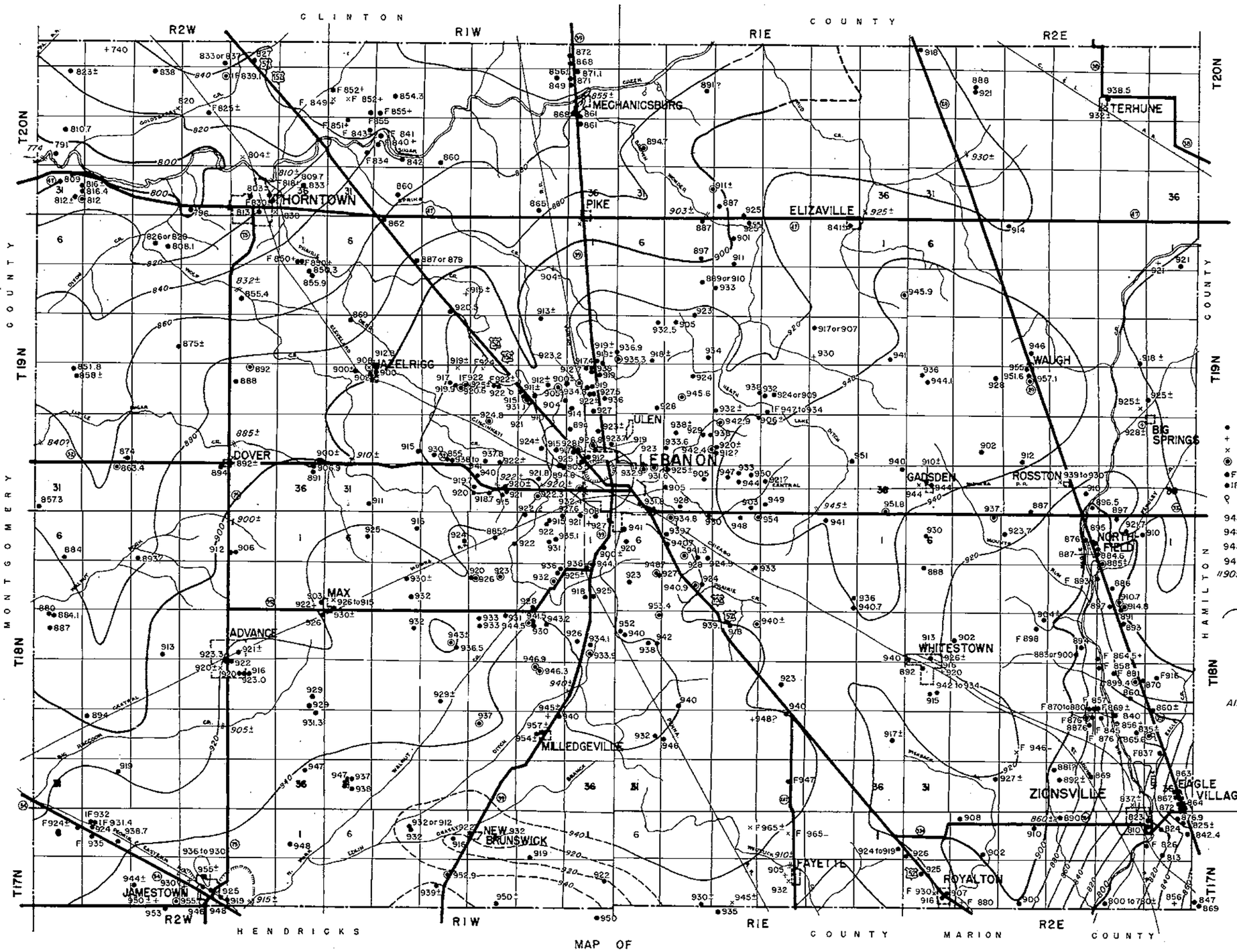

EXPLANATION

WELL LOCATION

- ● Definite
- \+ Indefinite
- × General
- ◉ Shallow well, less than 32 feet
- ●F Perennial flowing well
- ●IF Intermittent flowing well
- ♀ Spring

948 – Water level elevation, record from published report
948 Reported water level elevations
948.6 Measured water level elevation
948 ± Approximate water level elevation
//905 ± Approximate elevation of water surface of stream

CONTOURS OF PIEZOMETRIC SURFACE AND WATER TABLE, 1947; DASHED WHERE APPROXIMATE

CONTOUR INTERVAL 20 FEET

All elevations in feet above mean sea level

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

DIAGRAM OF TOWNSHIP

MAP OF

BOONE COUNTY, INDIANA

SHOWING

CONTOURS OF THE PIEZOMETRIC SURFACE

AND

WATER TABLE

1947

0 1 2 3 4 5 6 MI.

0 5,000 10,000 15,000 20,000 FT.

SCALE

	R2W	R1W	R1E	R2E
T20N	A	B	C	D
T19N	E	F	G	H
T18N	I	J	K	L
T17N	M	N	O	P

LETTER DESIGNATION OF TOWNSHIPS IN WELL-NUMBERING SYSTEM

BASE FROM POST OFFICE RURAL DELIVERY MAP OF BOONE COUNTY