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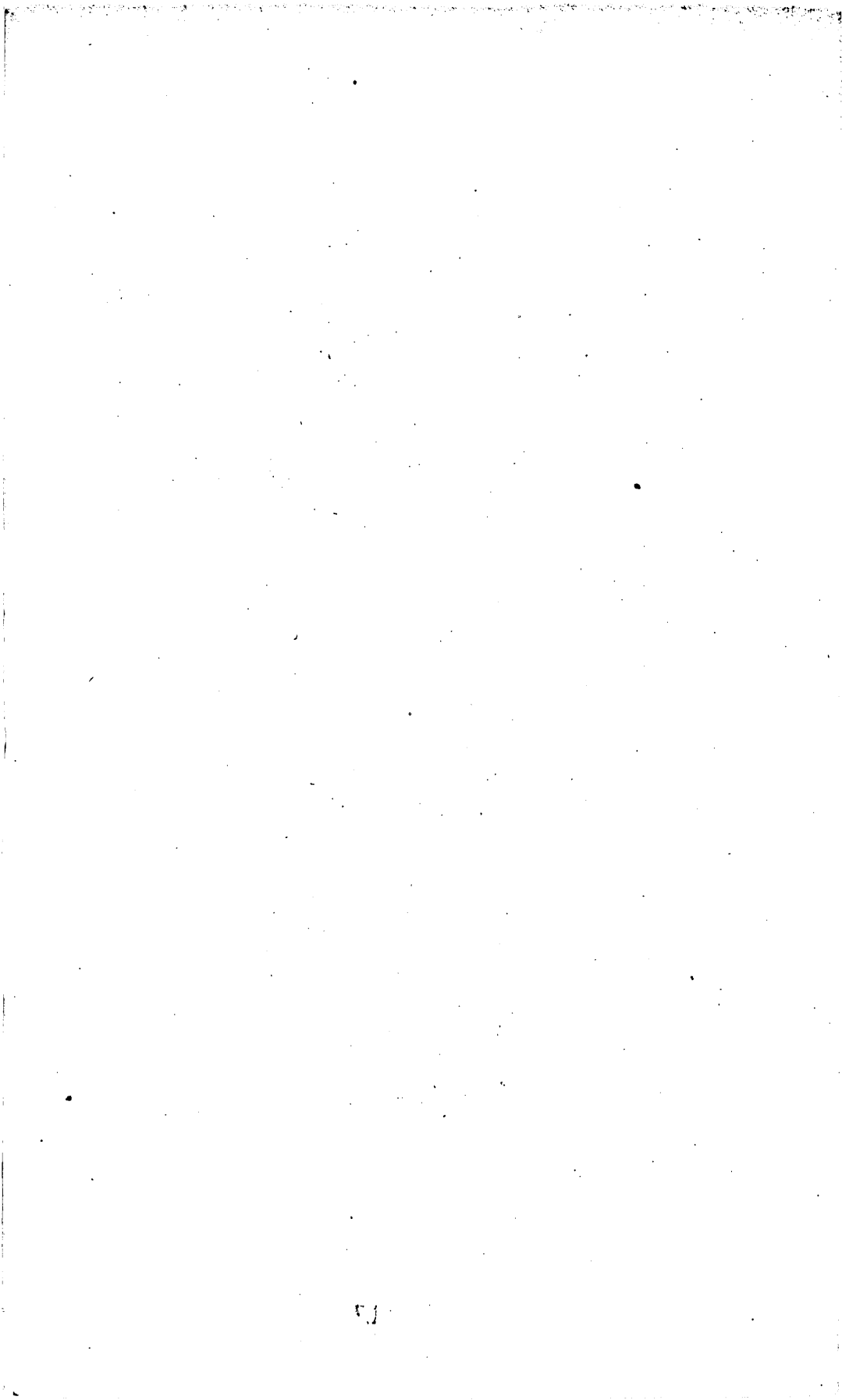
RECORD OF DEEP-WELL DRILLING
FOR 1905

BY

MYRON I. FULLER AND SAMUEL SANFORD

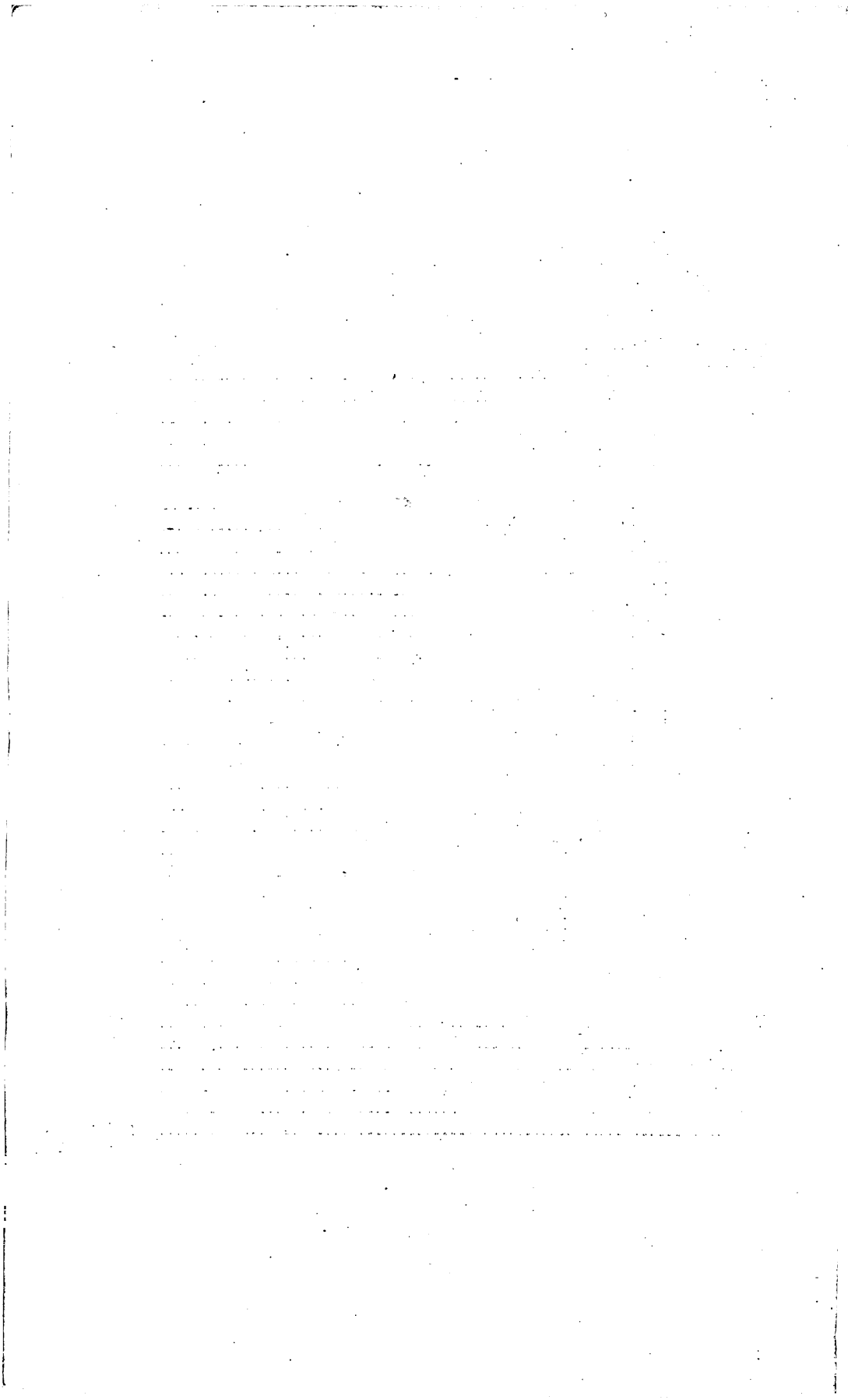


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RECORD OF DEEP-WELL DRILLING FOR 1905.

By MYRON L. FULLER and SAMUEL SANFORD.

PROGRESS IN THE COLLECTION OF WELL RECORDS AND SAMPLES, 1905.

By MYRON L. FULLER.

The present is the second of the series of reports on the collection of deep-well samples, the first of which, covering the period from the beginning of the work July 1, 1904, to December 31, 1904, was published as Bulletin No. 264. This report presents the records of a large number of wells from which more or less complete sets of samples have been secured and placed on file at the Survey, and also many additional records not represented by samples.

The work has been conducted by the eastern section, division of hydrology, the expense being shared with the western section of hydrology and the geologic branch. The writer has continued in charge of the investigations and has been assisted by Messrs. E. F. Lines and Samuel Sanford. The burden of executive details has fallen mainly on Mr. Sanford since his assignment to the work on its relinquishment by Mr. Lines April 1. The methods followed are in most particulars those formulated by Mr. A. C. Veatch on the inauguration of the work in 1904, but to Mr. Sanford is due the credit for materially increasing the usefulness of the work to the driller, especially in furnishing geologic information.

OBJECTS OF THE WORK.

GENERAL STATEMENT.

The chief objects of the collection of well samples and the publication of records were: (1) To encourage drilling by pointing out to prospective well owners the probabilities of success, (2) to assist drillers by helping them to a better understanding of the rock succession and by interpreting for them their samples and records, and (3) to furnish to geologists accurate stratigraphic data from which a more intimate economic or scientific knowledge of the geologic conditions could be derived.

Much has been accomplished toward achieving the objects indicated. The sinking of wells has been recommended in numerous instances, drillers have been furnished with advice, well samples have been described and explained, records have been interpreted, and geologists have been supplied with a large number of records. It is hoped that even more will be accomplished during the next year, and it is with the view of emphasizing to drillers and others the importance to them of the work that more detailed statements of the benefits are given in the following paragraphs.

ENCOURAGEMENT OF DRILLING.

It is the earnest wish of the Survey to encourage drilling for pure-water supplies. Each year a large number of requests for advice as to the desirability of drilling wells in different localities are received, and recommendations based on the prevailing conditions in the region in question are given. It is evident that every successful well tends to lead to the drilling of others for similar supplies, and the more definite the information that can be given as to depth, materials penetrated, quantity and quality of supply, and cost of the well, the better able is the person to judge of the advisability of sinking the well. Failures to obtain supplies do not always, in the long run, tend to discourage drilling, as the cause is often discoverable when accurate records are available and it is possible to suggest remedies so that following wells are more successful. Data as to the small water seams overlying the supposed main water-bearing bed are of great importance in suggesting sources of supply when for one reason or another the expected flow from the lower bed does not materialize. In general the shallower the wells, beyond a certain limit, the greater will be the demand for drillers, for it is evident that where water can be obtained within a relatively short distance of the surface and at a moderate cost much more drilling will be done in the aggregate than if the wells had to be sunk many hundreds or thousands of feet, in which case only towns or large corporations could afford to drill.

In order that the greatest number of wells may be drilled and the greatest success attained, it is desirable that the Survey be furnished, as a basis for its recommendations to those contemplating drilling, with as full data as possible regarding each well, whether deep or shallow (if over 100 feet) and whether successful or not.

Another point that should be more widely appreciated among drillers is that the man who goes about his work intelligently is most likely to secure the large contracts. The work of large corporations is generally conducted along severely practical lines, and when drilling is to be done practical men are selected. It is manifest that to the driller who gives careful attention to his work and who

not only sees that machinery is in proper condition and that it is properly handled, but also studies and keeps careful records of the character of the rocks to be penetrated, their dip, and the nature of the joints, seams, or bedding which may control the occurrence of water, a contract can be given with much greater assurance of success than to one who drills blindly ahead without such study and records.

ASSISTANCE TO DRILLERS OR OTHERS.

CORRESPONDENCE.

Information in regard to rock succession and structure.—No matter how complete and thorough a driller's information in regard to a given field may be, there almost always comes a time when he is required to sink a well in new and unknown territory. One of the commonest requests received by the Survey is for information as to the nature of the rock at a certain point in such regions, as to the depths of supposed productive horizons, and as to the characters of the formations which must be penetrated to reach them. This information will be cheerfully furnished by the Survey whenever the data are available, and it is hoped the driller and well owner will reciprocate by furnishing such details as will enable this organization to offer even more definite advice in the future.

Information in regard to prospects for water, oil, or gas.—The demand for information in regard to prospects for oil, gas, or water is great and constantly increasing. While it is of course impossible in most cases to make absolute predictions as to the occurrence of these substances, even after detailed investigations in the field, and it is still more impracticable to make them from the office, yet for certain regions and for certain rocks it is possible to make very definite statements and to give advice which if followed would prevent the waste of hundreds of thousands of dollars in drilling in hopeless situations. For other regions, while only the drill will finally decide the presence or absence of water, oil, or gas, certain generalizations can often be made from the success of wells in adjacent territory, the data relating to which are constantly being collected by the Survey, thereby enabling it to furnish to the driller free of cost information which might give him much trouble to obtain otherwise. Every record furnished by a driller helps to a better understanding of the conditions and makes possible the giving of more accurate advice by the Survey.

Suggestions in regard to drilling methods.—The methods of drilling in different types of material, the methods of handling quicksand, and many other problems connected with the sinking of deep wells are under investigation by the Geological Survey, which will gladly furnish the driller with such suggestions in regard to his difficulties as its experience warrants.

Examination and interpretation of samples.—In order to assist toward more intelligent drilling, the Survey will also examine the samples of such materials as the driller does not recognize or will interpret for him the logs of such wells as are represented by complete sets of samples.

PUBLICATIONS.

In addition to the aid rendered the driller by correspondence, as pointed out in the foregoing paragraphs, the Survey is enabled to assist the driller or well owner further through its publication of well records and other information relating to the occurrence of oil, gas, and water. Among the many ways in which reports containing such information may be of value, the following, which were pointed out in the first report on the sample system, may be repeated. To the oil and gas driller they furnish information as to (1) the best point for locating the well, (2) the depth of the supposed productive bed, (3) the character of the material to be penetrated, (4) the amount of water which will be encountered, (5) the amount of casing required, and (6) the limit of depth to which it is desirable to drill. To the owners of such wells information as to each of the foregoing points, especially those affecting the cost of the wells, is furnished by the records, in addition to data relating to still more important factors—namely, those of quantity and quality of supplies. In the case of drillers and owners of water wells the same information is furnished, but here the items affecting the cost are of increased importance, owing to the lower value of the product, and questions of head, quantity, and quality of supply again come to the fore. To prospective owners records show the results obtained by others and the probabilities of success of new ventures, while to the geologist they are of value in assisting to a more thorough understanding of the geology, which, in turn, enables him to answer more intelligently the numerous questions constantly referred to him by drillers, well owners, and others.

The reports giving information likely to be of interest to drillers are of several kinds, full descriptions of which are given on pages 10–14.

METHOD OF COLLECTING SAMPLES.^a

Arrangements for cooperation.—Cooperation with drillers forms the basis on which the work of collecting well samples is conducted. Problems are continually arising in the field in connection with drilling, and information is wanted by the driller as to the geologic formations to be encountered, the nature of peculiar materials brought up by the sand pump, and the probable depth and character of supplies. Careful attention is given to such requests, and all

^a For full description of office methods see Bull. U. S. Geol. Survey No. 264, 1905, pp. 27–39.

available information is furnished the applicant. From the records the geologist is able in many cases to give suggestions as to type of well, method of drilling, etc., and to offer such encouragement as the facts warrant to those contemplating the sinking of deep wells. In return the driller is requested to furnish written records of his wells and samples of materials penetrated, his assistance being acknowledged in the reports on well records issued annually.

List of drillers.—One of the first steps is to secure the names and addresses of competent drillers, a task of some difficulty because of the lack of a comprehensive drillers' directory, the nonexistence of any trade publication devoted to drilling, and the general absence of advertisements of drilling firms in engineering publications. Advertisements for bids, however, appear in such publications in case of most of the deeper water wells, and by communicating with owners the addresses of drillers are obtained. Some addresses are procured through news notes in the trade journals, especially in oil publications, while still others are obtained from well reports received from postmasters, town and county officials, and geologists in the field.

Initial correspondence.—To the addresses procured from the above and other minor sources letters are sent calling attention to the nature of the system for the collection of samples and records and the benefits to be derived from it by the driller. With the letter is inclosed a sample of the bags used for shipping the samples under frank through the mails. When favorable replies are received, notebooks especially devised for the use of drillers and containing pertinent suggestions and simple geologic definitions are mailed, together with a supply of canvas bags for mailing the individual samples.

When the drillers are not at the time engaged in drilling, special blanks are mailed for the purpose of obtaining records of previously completed wells. Similar blanks are also frequently sent to well owners. Much data of value in determining the geologic features of the different regions and of economic importance from the standpoint of underground waters and oil or gas has been procured in this manner.

Examination and filing of samples and records.—As soon as received at the office the samples are transferred from the bags to properly labeled glass bottles. Those most commonly used are approximately $2\frac{1}{4}$ inches long and three-fourths of an inch in diameter, but glass jars measuring 3 by $1\frac{1}{2}$ inches are employed where the fragments are larger or where they contain fossils or pebbles. As soon as a set of samples is completed it may be taken from the temporary filing cases in which it has previously been stored and, after reference to a geologist for examination and identification of horizons

where possible, placed in the permanent storage cases, which have a capacity of 432 bottles to a drawer, or 5,000 to a case measuring, approximately, 40 by 32 by 24 inches.

The notebooks, both those accompanying samples and those received independently, together with the records of completed wells obtained on the special well blanks, are filed by locality in the record files, all data pertaining to a given well being segregated and filed as a unit in a form convenient for consultation.

Confidential records.—Owing to the expense involved in obtaining information through drilling, the operator may sometimes desire that certain information he has furnished to the Survey for scientific purposes be regarded as confidential. In all such cases his wishes will be rigidly followed.

PUBLICATION OF RESULTS.

The results of the work of collecting samples are described in reports issued annually, the general plan being to present each year a list of persons cooperating in furnishing samples or records, a summary of the wells reported, and detailed records of selected wells. The material is thus quickly made available to drillers, well owners, and geologists, who are enabled to make immediate use of the information, instead of being compelled to wait for complete reports, which, in general, could only be prepared after many years of work, the data in the meanwhile being unavailable, except to a few connected with the Survey at Washington.

In addition to the reports descriptive of the systematic collection of samples and records, many other papers containing well records or giving information in regard to oil, gas, artesian waters, etc., have been published by the Survey. A list of these and an index to the subjects treated has been prepared by the writer and published by the Survey as Water-Supply and Irrigation Paper No. 120. Of these papers those which are likely to be of the most interest to drillers and well owners are given below. Those of which the supplies have not been exhausted can be obtained from the Director on request.

In the summary given below the following abbreviations are used for the various publications of the United States Geological Survey:

A. R.	Annual Reports.
P. P.	Professional Papers.
B.	Bulletins.
M. R.	Reports on Mineral Resources.
G. F.	Geologic Folios.
M.	Monographs.
W. S. P.	Water-Supply and Irrigation Papers.

SURVEY PUBLICATIONS RELATING TO OIL, GAS, AND ASPHALT.

- The Trenton limestone as a source of petroleum and inflammable gas in Ohio and Indiana, by E. Orton: A. R. 8, pt. 2.
- Origin, constitution, and distribution of rock gas and related bitumens, by W. J. McGee: A. R. 11, pt. 1.
- The natural-gas field of Indiana, by A. J. Phinney: A. R. 11, pt. 1.
- Natural gas in 1894, by J. D. Weeks: A. R. 16, pt. 6.
- The uintaite (gilsonite) deposits of Utah, by G. H. Eldridge: A. R. 17, pt. 1.
- The asphalt deposits of western Texas, by T. W. Vaughan: A. R. 18, pt. 5.
- The coal and pitch coal of the Newport mine, Oregon, by W. C. Day: A. R. 19, pt. 3.
- Petroleum, by F. H. Oliphant: A. R. 19, pt. 6.
- Preliminary description of the geology and water resources of the Black Hills and adjoining regions in South Dakota and Wyoming, by N. H. Darton: A. R. 21, pt. 4.
- The asphalt and bituminous rock deposits of the United States, by G. H. Eldridge: A. R. 22, pt. 1.
- The Gaines oil field in northern Pennsylvania, by M. L. Fuller: A. R. 22, pt. 3.
- Preliminary report on the geology and underground-water resources of the central Great Plains, by N. H. Darton: P. P. 32.
- A geological reconnaissance in northwest Wyoming, by G. H. Eldridge: B. 119.
- Oil and gas fields of the western interior and northern Texas coal measures and of the upper Cretaceous and Tertiary of the western Gulf coast, by G. I. Adams: B. 184.
- The Berea grit oil sand in the Cadiz quadrangle, Ohio, by W. T. Griswold: B. 198.
- Oil fields of the Texas-Louisiana Gulf Coastal Plain, by C. W. Hayes and W. Kennedy: B. 212.
- Recent work in the bituminous coal field of Pennsylvania, by M. R. Campbell: B. 213.
- Origin and distribution of asphalt and bituminous rock deposits in the United States, by G. H. Eldridge: B. 213.
- The petroleum fields of California, by G. H. Eldridge: B. 213.
- The Boulder, Colo., oil field, by N. M. Fenneman: B. 213.
- Asphalt, oil, and gas in southwestern Indiana, by M. L. Fuller: B. 213.
- Structural work during 1901-2 in the eastern Ohio oil fields, by W. T. Griswold: B. 213.
- Oil fields of the Texas-Louisiana Gulf Coastal Plain, by C. W. Hayes: B. 213.
- Asphalt deposits of Pike County, Ark., by C. W. Hayes: B. 213.
- Notes on the geology of southwestern Idaho and southeastern Oregon, by I. C. Russell: B. 217.
- Structure of the Boulder oil field, Colorado, with records for the year 1903, by N. M. Fenneman: B. 225.
- The Hyner gas pool, Clinton County, Pa., by M. L. Fuller: B. 225.
- Oil and gas fields of eastern Greene County, Pa., by R. W. Stone: B. 225.
- Economic geology of the Iola quadrangle, Kansas, by G. I. Adams, E. Haworth, and W. R. Crane: B. 238.
- Mineral resources of the Elders Ridge quadrangle, Pennsylvania, by R. W. Stone: B. 256.
- Oil and asphalt prospects in Salt Lake basin, Utah, by J. M. Boutwell: B. 260.
- The Florence, Colo., oil field, by N. M. Fenneman: B. 260.
- Oil fields of the Texas-Louisiana Gulf coast, by N. M. Fenneman: B. 260.
- Salt and other resources of the Watkins Glen quadrangle, New York, by E. M. Kindle: B. 260.
- Natural gas near Salt Lake City, Utah, by G. B. Richardson: B. 260.
- Salt, gypsum, and petroleum in trans-Pecos Texas, by G. B. Richardson: B. 260.
- Oil and gas of the Independence quadrangle, Kansas, by F. C. Schrader and E. Haworth: B. 260.

Notes on the geology of the Muscogee oil fields, Indian Territory, by J. A. Taff and M. K. Shaler: B. 260.

Oil fields of the Texas-Louisiana Gulf Coastal Plain, by N. M. Fenneman: B. 282.

The Salt Lake oil field near Los Angeles, Cal., by R. Arnold: B. 285.

The Nineveh and Gordon oil sands in western Greene County, Pa., by F. G. Clapp: B. 285.

Ozokerite deposits in Utah, by J. A. Taff and C. D. Smith: B. 285.

The asphaltum deposits of California, by E. W. Hilgard: M. R. 1883-84.

Asphaltum, by C. Richardson: M. R. 1893.

Petroleum, by F. H. Oliphant: M. R. 1903, 1904.

Natural gas, by F. H. Oliphant: M. R. 1903, 1904.

Asphaltum and bituminous rock, by E. O. Hovey: M. R. 1903, 1904.

The following folios contain references to oil, gas, and asphalt: Nos. 17, 40, 53, 64, 72, 76, 82, 84, 92, 94, 98, 102, 105, 107, 110, 115, 121, 123, 125, 132, 134, 135.

In addition to the references given to the Mineral Resources of the United States, those for the years not mentioned will be found to contain articles on oil, natural gas, and asphalt. The latest and most important articles have been cited.

SURVEY PUBLICATIONS RELATING TO UNDERGROUND WATERS, BORINGS, AND METHODS OF WELL DRILLING.

GENERAL DESCRIPTIVE REPORTS.

Alabama.—W. S. P. 102, 114.

Arizona.—W. S. P. 104, 136.

Arkansas.—W. S. P. 102, 110, 114, 145.

California.—W. S. P. 59, 60, 116.

Colorado.—A. R. 16, pt. 2; 17, pt. 2; 21, pt. 4; 22, pt. 4; P. P. 32; B. 131; G. F. 36, 68, 71.

Connecticut.—W. S. P. 102, 110, 114.

Cuba.—W. S. P. 110.

Delaware.—B. 138; W. S. P. 114.

District of Columbia.—B. 138; G. F. 70; W. S. P. 114.

Florida.—W. S. P. 102, 114.

Georgia.—B. 138; W. S. P. 102, 114.

Hawaii.—W. S. P. 77.

Idaho.—B. 199; G. F. 104; W. S. P. 54, 55, 78.

Illinois.—A. R. 17, pt. 2; G. F. 67, 81, 105; W. S. P. 114.

Indiana.—A. R. 18, pt. 4; G. F. 67, 81, 105; W. S. P. 21, 26, 114.

Iowa.—A. R. 16, pt. 2; W. S. P. 114, 145.

Kansas.—A. R. 21, pt. 4; 22, pt. 4; P. P. 32; B. 131; W. S. P. 6, 145.

Kentucky.—W. S. P. 102, 110, 114.

Louisiana.—W. S. P. 101, 114.

Maine.—W. S. P. 102, 114, 145.

Maryland.—B. 138; G. F. 13, 23, 70; W. S. P. 110, 114, 145.

Massachusetts.—W. S. P. 102, 110, 114, 145.

Michigan.—B. 30, 31; W. S. P. 102, 114, 145.

Minnesota.—W. S. P. 102, 114.

Mississippi.—W. S. P. 102, 114.

Missouri.—W. S. P. 102, 110, 114, 145.

Nebraska.—A. R. 16, pt. 2; 19, pt. 4; 21, pt. 4; 22, pt. 4; P. P. 17, 32; B. 131; G. F. 85, 108; W. S. P. 12.

New Hampshire.—W. S. P. 102, 114, 145.

New Jersey.—B. 138; W. S. P. 106, 110, 114.

New Mexico.—A. R. 21, pt. 4; 22, pt. 4; W. S. P. 123.

New York.—B. 138; W. S. P. 102, 110, 114, 145.

North Carolina.—B. 138; G. F. 80; W. S. P. 110, 114.

- North Dakota*.—A. R. 17, pt. 2.
Ohio.—A. R. 18, pt. 4; 19, pt. 4; W. S. P. 114.
Oklahoma.—A. R. 21, pt. 4; 22, pt. 4.
Oregon.—B. 252; W. S. P. 78.
Pennsylvania.—G. F. 121; W. S. P. 106, 110, 114, 145
Rhode Island.—W. S. P. 102, 114.
South Carolina.—B. 138; W. S. P. 114.
South Dakota.—A. R. 17, pt. 2; 18, pt. 4; 21, pt. 4; P. P. 32; G. F. 85, 96, 97, 99, 100,
 107, 108, 113, 114; W. S. P. 34.
Tennessee.—W. S. P. 102, 114.
Texas.—A. R. 18, pt. 2; 21, pt. 4; 21, pt. 7; 22, pt. 4; G. F. 42.
Utah.—W. S. P. 7.
Vermont.—W. S. P. 102, 110, 114.
Virginia.—B. 138; G. F. 13, 23, 70, 80; W. S. P. 114
Washington.—G. F. 86; W. S. P. 4, 55.
West Virginia.—W. S. P. 110, 114, 145.
Wisconsin.—W. S. P. 114, 145.
Wyoming.—A. R. 21, pt. 4; P. P. 32; G. F. 107.

SPECIAL REPORTS.

MINERAL AND POTABLE WATERS.

- The potable waters of eastern United States, by W. J. McGee: A. R. 14, pt. 2.
 Natural mineral waters of the United States, by A. C. Peale: A. R. 14, pt. 2.
 Mineral waters, by A. C. Peale: A. R. 16, pt. 4; 17, pt. 3; 18, pt. 5; 19, pt. 6; 20, pt. 6;
 21, pt. 6; M. R. 1883 to 1893.
 Lists and analyses of the mineral springs of the United States; a preliminary study, by
 A. C. Peale: B. 32.
 Analyses of waters of the Yellowstone National Park, with an account of the methods of
 analysis employed, by F. A. Gooch and J. E. Whitfield: B. 47.

SPRINGS AND SPRING DEPOSITS.

- Formation of travertine and siliceous sinter by the vegetation of hot springs, by W. H.
 Weed: A. R. 9.
 Lists and analyses of the mineral springs of the United States; a preliminary study; by
 A. C. Peale: B. 32.
 Analyses of waters of the Yellowstone National Park, with an account of the methods of
 analysis employed, by F. A. Gooch and J. E. Whitfield: B. 47.
 Contributions to hydrology of eastern United States, 1904, M. L. Fuller, geologist in charge:
 W. S. P. 110.
 Spring system of the Decaturville dome, Camden County, Missouri, by E. M. Shepard:
 W. S. P. 110.
 Notes on the hydrology of Cuba, by M. L. Fuller: W. S. P. 110.
 Waters of a gravel-filled valley near Tully, N. Y., by G. B. Hollister: W. S. P. 145.
 Notes on certain hot springs of the southern United States, by Walter Harvey Weed:
 W. S. P. 145.
 Notes on certain large springs of the Ozark region, Missouri and Arkansas, compiled by
 M. L. Fuller: W. S. P. 145.
 Yellowstone National Park folio, Wyoming, by A. Hague, W. H. Weed, and J. P. Iddings:
 G. F. 30.

LAWS RELATING TO UNDERGROUND WATERS.

- Relation of the law to underground waters, by D. W. Johnson: W. S. P. 122.

ARTESIAN REQUISITES, MOVEMENTS OF GROUND WATERS, ETC.

- The requisite and qualifying conditions of artesian wells, by T. C. Chamberlin: A. R. 5.
- Principles and conditions of the movements of ground water, by F. H. King: A. R. 19, pt. 2.
- Theoretical investigation of the motion of ground waters, by C. S. Slichter: A. R. 19, pt. 2.
- The motions of underground waters, by C. S. Slichter: W. S. P. 67.
- Description of underflow meter used in measuring the velocity and direction of underground water, by C. S. Slichter: W. S. P. 110.
- Underflow tests in the drainage basin of Los Angeles River, by H. Hamlin: W. S. P. 112.
- Underground waters of eastern United States, M. L. Fuller, geologist in charge: W. S. P. 114.
- Field measurements of the rate of movement of underground waters, by C. S. Slichter: W. S. P. 140.
- Observations of the ground waters of the Rio Grande Valley, by C. S. Slichter: W. S. P. 141.
- Two unusual types of artesian flow, by M. L. Fuller: W. S. P. 145.
- Water resources of the Portsmouth-York region, New Hampshire and Maine, by G. O. Smith: W. S. P. 145.

BIBLIOGRAPHY OF UNDERGROUND WATERS.

- Bibliographic review and index of papers relating to underground waters, 1879-1904, by M. L. Fuller: W. S. P. 120.
- Bibliographic review and index of underground-water literature published in the United States, 1905, by M. L. Fuller, F. G. Clapp, and B. L. Johnson: W. S. P. 163.

WELL-DRILLING METHODS.

- Geology and underground-water resources of northern Louisiana and southern Arkansas, by A. C. Veatch: P. P. 46.
- Oil fields of the Texas-Louisiana Gulf Coastal Plain, by C. W. Hayes and W. Kennedy: B. 212.
- Oil fields of the Texas-Louisiana Gulf Coastal Plain, by N. M. Fenneman: B. 282.
- Underground waters of southern Louisiana, by G. D. Harris: W. S. P. 101.
- The California or "stovepipe" method of well construction, by C. S. Slichter: W. S. P. 110.

MEASUREMENTS OF FLOW AND HEAD.

- Approximate methods of measuring the yield of flowing wells, by C. S. Slichter: W. S. P. 110.
- Corrections necessary in accurate determinations of flow from vertical well casings, from notes furnished by A. N. Talbot: W. S. P. 110.
- Field measurements of the rate of movement of underground waters, by C. S. Slichter: W. S. P. 140.
- A convenient gage for determining low artesian heads, by M. L. Fuller: W. S. P. 145.

LISTS OF WELLS AND BORINGS.

- Record of deep well drilling for 1904, by M. L. Fuller, E. F. Lines, and A. C. Veatch: B. 264.
- Preliminary list of deep borings in United States, pt. 1, by N. H. Darton: W. S. P. 57.
- Preliminary list of deep borings in United States, pt. 2, by N. H. Darton: W. S. P. 61.
- Contributions to the hydrology of eastern United States, 1903, by M. L. Fuller: W. S. P. 102.
- Preliminary list of deep borings in the United States, second edition, with additions, by N. H. Darton: W. S. P. 149.

WELL RECORDS.

By SAMUEL SANFORD.

INTRODUCTION.

The definition of a deep well is so variable in different localities that it has been difficult to determine where to draw the line in selecting logs for publication in the present report on deep-well drilling in 1905. In many localities a 100-foot well is regarded as deep, while in others 500 or even 1,000 feet is the limit fixed. Nor is the value of a record necessarily dependent on depth, the data of certain shallow wells being more important than those of many of the deeper ones. There are, moreover, a large number of drillers, especially those using light portable rigs for drilling domestic wells, who are interested in relatively shallow wells, for which reason the present report is made to cover all wells over 100 feet in depth. That shallower wells are not included does not mean that details of such wells have not been obtained, nor that they are not deemed worthy of record. The line is drawn as indicated because the number of records of shallow wells is so great as to prohibit their inclusion in a report primarily relating to deep wells.

Many hundreds of records that have been obtained by the Survey during the past year are not published here, but are reserved for use in the preparation of special reports on particular districts where it is desired to present with the greatest exactness the relations of the underlying rocks or the depths to certain beds. Such records are of particular value in the preparation of the structural geology maps that appear in the various folios of the Geologic Atlas of the United States, many hundred logs often being collected and compared before the publication of a folio, especially in the case of those located in the oil and gas fields of Pennsylvania and other States. It is because of the omission of such records that so few wells from the more active districts, where the rock succession in many places is well known, are included. The object, on the contrary, has been to present records from the scattering or so-called "wild-cat" wells drilled in new or little-known territory.

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Salsman, W. T., Damsel, Mo.
Sanders, E. J., Saratoga Springs, N. Y.
Sanders, R. C., Corsicana, Tex.
Sanford, M., McGraw, N. Y.
Saunders, J. A., Cattaraugus, N. Y.
Schmitt, Max, Cullman, Ala.
Schwab, H. T., Van Raub, Tex.
Schwarz, Richard, Boerne, Tex.
Schwarz, Wm., Boerne, Tex.
Seabaugh, C., Patton, Mo.
Sealy, W. F., Fond du Lac, Wis.
Selleck, Ezra, Narrowsburg, N. Y.
Shaffer Bros. & Co., Ramona, Ind. T.
Shank, S. T., Granby, Mo.
Shanks, Oscar, Alexandria, La.
Shannahan, J. H. K., Artesian Well Company, Easton, Md.
Shaw, J. D., Sioux City, Iowa.
Shear, Wm. C., Binghamton, N. Y.
Shiffer, E. L., Loschs, Pa.
Shimp, H. E., Cappahosic, Va.
Shinn, Levi, Grandin, Mo.
Shirkliff & Anderson, R. F. D. 2, Selma, Ind.
Shogren, J., driller for J. F. McCarthy, Fergus Falls, Minn.
Shugert, Jas., Annapolis, Ill.
Shute, C. E., Rockland, Me.
Simmons, Jos., jr., Mount Sterling, Ill.
Simons & Mayrant, Charleston, S. C.
Simpson, M., Nowata, Ind. T.
Sinclair & Bradburn, Wetumka, Ind. T.
Sipperly, E. N., jr., Westport, Conn.
Slay, Chas. D., Claude, Tex.
Smith, C. B., Blackrock, Ark.
Smith, Dan R., Center Ridge, Ark.
Smith, H. E., Deland, Fla.
Smith, Ira T., El Reno, Okla.
Smith, Jacob H., McGregor, Tex.
Smith, J. W., Rolla, Mo.
Smith, L. L., Sulphur, Ind. T.
Smith, R. M., San Luis Obispo, Cal.
Smith, S. N., 401 Virginia avenue, Joplin, Mo.
Smith, Tom, R. F. D. 1, Dupont, S. C.
Smith, W. E., Box 466, Mexico, Mo.
Snow, J. B., Bangs, Tex.
Sonntag, L. W., Tulsa, Ind. T.
Sparks, G. W., Cleveland, Okla.
Spencer Brothers, Earling, S. Dak.

Spencer, G. W., Box 352, Durango, Col.
Spinnrath, Chas., Comfort, Tex.
Stacey, P. J., Granite, Okla.
Stahl, Fred, Getzville, N. Y.
Standifer, W. W., Comanche, Tex.
Stanley, E. T., La Harpe, Kans.
Star Drilling Company, Connell, Wash.
Stark, C. A., Eldorado, Tex.
Stearns, J. C., Mullen, Tex.
Stedman, W. A., Rolla, Mo.
Steen, Andrew, Park River, N. Dak.
Steinsiek, H. W., 4321 Prairie avenue, St. Louis, Mo.
Stephenson, G. B. M., Burkeville, Ky.
Stermer, J. E., Bremen, Ohio.
Sternner, H. D., Southwest City, Mo.
Steward, T. J. & Co., Lahusage, Ala.
Stocker, Fred, Highlands, Ill.
Stothoff Brothers, Flemington, N. J.
Strait, E. C., Prentiss Vale, Pa.
Sturm, H. L., Glasgow, Ky.
Sudheimer, F. A., Weldon, Mo.
Sutter, Frank, Pensacola, Fla.
Sutter, J. A., Pass Christian, Miss.
Suttles, L. T., Jenkins, Mo.
Swan Brothers, Locusthill, Mo.
Swarthout, H. L., Boody, Ill.
Swartwood, Malon, Eufaula, Ind. T.
Swensen, S., 258 Plymouth avenue, Minneapolis, Minn.
Tanner, C. H., Shelbyville, Mo.
Teakle & Sweetapple, 688 East Thirty-eighth street, Los Angeles, Cal.
Teeter, B. F., Geary, Okla.
Teeter, W. G., R. F. D. 10, Dayton, Ohio.
Templin, J. G., Whitesburg, Tenn.
Tenney, Clayton, Rushville, N. Y.
Texas Drilling Company, Beaumont, Tex.
Thomas, A. R., Charlottesville, Va.
Thomas, P. M., Phillipsburg, Mo.
Thomas, W. E., Castle Rock, Ore.
Thomas, W. J., Climax Springs, Mo.
Thomasson, W. B., Frederickton, Mo.
Thompson, E. C., Lisbon, Ill.
Thompson, H. E., Kenton, Okla.
Thompson, Jos. S., Pryor Creek, Ind. T.
Thorpe, Alfred L., Adger, Ala.
Thresher, J. M., Box 130, Nacogdoches, Tex.
Tinini, Chas., R. F. D. 5, Clifton, Tenn.
Tomlin, Jas., Moro, Ore.
Trent, Robt. P., Odessa, Tex.
Trentlage, Wm., Spring Valley, Ill.
Trow, L. C., Genoa Junction, Wis.
Ulmer, B. R., Ruffin, S. C.
Underwood, Chas. F.
Urban Drilling Company, Bartlesville, Ind. T.

Vanderstucken, E. F., Sonora, Tex.
Vandervelden, A. N., Gregory, S. C.
Van Gaasbeck, Geo., Wasco, Oreg.
Vangundy, D. F., Philo, Ill.
Van Gunten, Jacob, Massillon, Ohio.
Wackerman, Chas., Swormville, N. Y.
Waddell, J. M., Morrell, Ark.
Wade, F. M., Granby, Mo.
Walker, A. C., Berryville, Ark.
Walker, A. J., R. F. D. 2, Bloomdale, Ohio.
Walker, E. R., Nome, Alaska.
Wallen, L. B., Keene, Tex.
Warren, E. A., Dexter, N. Mex.
Washburn, J. W., De Soto, Mo.
Watkins & Co., Van Camp, W. Va.
Watkins, Tom, Fredericktown, Mo.
Weber, Wm., Kenosha, Wis.
Weiler, F. S., R. F. D. 1, Milton, W. Va.
Weiler, J. G., R. F. D. 1, Milton, W. Va.
Wescott, B. R. & Son, West Plains, Mo.
Westerman, C. S., Jamestown, N. Y.
West Virginia Drilling Company, Cleveland, Okla.
White, J. J., San Diego, Tex.
Wideman, Lawson, Luebbering, Mo.
Wrightman, Jas. C., Branchport, N. Y.
Wilburn, H. H., Odessa, Wash.
Wilburn, J. A., Quincy, Wash.
Wildrick, Glenn, Cuba, N. Y.
Wilkins, H. C., Evangeline, La.
Willard, S. W., Lufkin, Tex.
Williams, E. W., Reevey, Wis.
Williams, J. P., Okemah, Ind. T.
Williams, J. W., 2800 Cherry street, Kansas City, Mo.
Williams, J. W., R. F. D. 18, New Harmony, Ind.
Wilsey, E. E., Rutledge, Mo.
Wilson, H. K., 762 West Twelfth street, Chicago, Ill.
Wilson, L., Well Company, 225 Dearborn street, Chicago, Ill.
Winger, Josiah G., Grand Valley, Pa.
Wise, Chas. S., 2544 Grand avenue, St. Louis, Mo.
Wise, Wm., Bethany, Mo.
Wood, J. H., Big Creek, Mo.
Wood, T. J., 328 Binz Building, Houston, Tex.
Woodruff Brothers, Dodd City, Ark.
Wright, W. P., Wentworth, Mo.
Wright, J. L., Dundas, Ill.
Wyman, M. S., Iuka, Ill.
Yaden, B. A., Brodhead, Ky.
Yates, J. S., Junction City, Tex.
Yeager, Frank H., 430 York street, Salt Lake City, Utah.
Yeager, G. W., Smithton, Mo.
Young, G. B., Dryden, Mo.
Young, J. W., Fort Smith, Ark.
Younger, G. F. & Sons, Wheeling, Ark.

Zenser, A., Hillsboro, Mo.
Zenser, L. M., Hillsboro, Mo.
Ziegenfuss, T. A., Sellersville, Pa.
Zimmer, W. T., Bartlesville, Ind. T.

In addition to the drillers and contractors named, thanks are due many well owners and other persons who have taken an interest in the work, in many cases at a considerable outlay of time in collecting samples and compiling records.

Owners and others furnishing records or samples.

Alabama-California Oil Company, Sheffield, Ala.
Aldrich, L. L., Falls City, Nebr.
Allen, R. P., & Co., Batson, Tex.
Almeda Oil Company, Bartlesville, Ind. T.
Amarillo Light and Power Company, Amarillo, Tex.
Anaheim Union Water Company, San Bernardino, Cal.
Andrews, G. T., Wasco, Oreg.
Atchison, Topeka and Santa Fe Railway, engineering department, Chicago, Ill.
Benner, G. E., Claire, Mich.
Bergh, Lester, Sharon, N. Y.
Biggs, J. O., Cambray, N. Mex.
Birmingham Oil Company, Chandler, Col.
Blake, C. S., St. Joseph, Mich.
Bond, Jesse, Corona, N. Mex.
Bowden, Wm., manager Madison Oil and Development Company, Adrian, Mich.
Breesport Deep Well Company, Breesport, N. Y.
Brock, Henry F., Cambray, N. Mex.
Brown, Geo. S., Ethlyn, Mo.
Brown, R. G., and Harrison, T. S., Florence, Colo.
Brown, Ives L., Waring, Tex.
Buck, A. P., Duran, N. Mex.
Buck, B. B., Capt., U. S. A.
Burch, Eli, Devine, Tex.
Call, C. A., Artesia, N. Mex.
California-Chickasaw Oil and Asphalt Company, Roff, Ind. T.
Camden Waterworks, Camden, N. J.
Chappell, L. H., mayor, Columbus, Ga.
Cheshire Gas Company, Cheshire, Ohio.
Chicago, Burlington and Quincy Railway, engineering department, Chicago, Ill.
Chicago, Milwaukee and St. Paul Railway, engineering department, Chicago, Ill.
Chicago and North-Western Railway, engineering department, Chicago, Ill.
Clark, F. P., Dexter, N. Mex.
Clarion Gas Company, Clarion, Pa.
Cole, F. W., Capt., U. S. A.
Colorado Springs and Florence Oil and Coal Company, Florence, Colo.
Collins, M. F., superintendent waterworks, Lawrence, Mass.
Collins, B. F., Onalaska, Wis.
Corsicana Petroleum Company, Corsicana, Tex.
Coshocton Oil and Gas Company, Lancaster, Ohio.
Cotter, T. B., Pinehurst, N. C.
Crane & Co., Pittsfield, Mass.
Crown Oil Company, Batson, Tex.

Crum, Geo. W., director Strong City Oil and Gas Company, Strong City, Kans.
Crummy, J., civil engineer, waterworks, Houston, Tex.
Crump, M. H., Bowling Green, Ky.
Cully, J. E., Glasgow, Ky.
Curl & Scott, Bartlesville, Ind. T.
Curtis, S. J., local manager Oil Well Supply Company, Petrolia, Tex.
Davis, James L., Magdalena, N. Mex.
Devenport, P. F., Waxahachie, Tex.
Delaware, Lackawanna and Western Railroad, engineering department, Hoboken, N. J.
Dennis, W. W., Charles City, Iowa.
Driskill, Dr. T. F., Corsicana, Tex.
East Texas Oil Company, Galveston, Tex.
Ellis, R. N., superintendent waterworks, Jacksonville, Fla.
El Paso and Northeastern Railroad, El Paso, Tex.
Emerson Manufacturing Company, Lawrence, Mass.
Farish, W. S., Beaumont, Tex.
Ferrell, Herman, Cheshire, Ohio.
Finzel, P. E., manager Piney Run Oil Company, Finzel, Md.
Floyd, E. A., president Jackson Water Company, Jackson, Ohio.
Florida East Coast Hotel, St. Augustine, Fla.
Ford, C. T., superintendent O. C. R. C. Co., Central Valley, N. Y.
Fort Gibson Oil and Gas Company, Fort Gibson, Ind. T.
Fort Worth and Denver City Railway, Fort Worth, Tex.
Freeman, H. R., Unionville, Tenn.
Frisco Ore Mining Company, West Plains, Mo.
Garrard, Louis F., jr., Capt., U. S. A.
Gates, Mrs. Mary J., Mountain View, Cal.
Gearing, C. M., Brownwood, Tex.
Germantown Artesian Well Company, Germantown, N. Y.
Gerry, Edmund W., Ventura, Cal.
Gettysburg Water Company, Gettysburg, Pa.
Gilbert, S. W., 4312 Main street, Kansas City, Mo.
Graceville Electric Light and Power Company, Graceville, Fla.
Guade, E. R., Oil Well Supply Company, Oil City, Pa.
Graves, Dr. W. B., Southport, Conn.
Gregg, F. M., normal school, Wayne, Ill.
Hammil, F., Spooner, Wis.
Hatch, S. J., 408 Hall Building, Kansas City, Mo.
Heath, H. W., Lynn, Mass.
Heywood Oil Company, Beaumont, Tex.
Hico-Iredell Oil Company, Hico, Tex.
Higday, C. L., Lake Arthur, N. Mex.
Highland Water Company, El Paso, Tex.
Himmelburger-Harrison Lumber Company, Morehouse, Mo.
Hodgson, Isaac, Pleasantville, Iowa.
Hollebaugh, A. F., Natroona Improvement Company, Alcovia, Wyo.
Honeoye Light and Heat Company, Honeoye, N. Y.
Hunter, T. B., resident engineer, Pacific Improvement Company, Pacific Grove, Cal.
Illinois Central Railroad, Chicago, Ill.
Imler, Garn & Co., Helena, Ohio.
Interstate Oil Company, Akron, Ohio.
Jennings, Alfred E., Detroit, Mich.
Johnston, James, Summit, Ill.
Johnson, Geo. H., manager Texas Drilling Company, Beaumont, Tex.

Jones, Arthur, Tablequah, Ind. T.
Jones, True W., Brewing Company, Manchester, N. H.
Kelly, Harry E., president Mansfield Gas Company, 21 North Sixth street, Fort Smith,
Ark.
Kentucky Oil and Mining Company, Louisville, Ky.
Knapp, I. N., Chanute, Kans.
Lafferty, John T., Martinsville, Ill.
Lamoreux, T. B., Capt., U. S. A.
Larne & Hubbard, Palestine, Ill.
Leather Brothers, Joplin, Mo.
Lee, Chas. A., Amber Oil Company, Jacksboro, Tex.
Leogo, W. L., Aledo, Okla.
Leonard, Jesse L., Red Fork, Ind. T.
McCoombs, C. J., Keenes, Ill.
Mansfield Electric Railway, Light and Power Company, Mansfield, Ohio.
Menominee Brick Company, Menominee, Mich.
Meridian Oil and Gas Company, Meridian, Okla.
Miller, Frank S., Columbus, Ohio.
Mohr, C. H., Nelsonville, Mo.
Moore, M. E., Lisbon, N. Dak.
Mulcahy, R. T., Rosenberg, Tex.
Narragansett Brewing Company, Arlington, R. I.
National Calfskin Company, Peabody, Mass.
Nenno Brothers, Allegany, N. Y.
Newton County Fruit Farm, Seneca, Mo.
New York-Alabama Oil Company, 32 Broadway, New York, N. Y.
Norton Oil Company, Wellsville, N. Y.
Northwestern Ohio Natural Gas Company, Toledo, Ohio.
Nudd, J. S., La Harpe, Ill.
Oakland Oil and Gas Company, Butler, Pa.
Oliphant, F. H., Oil City, Pa.
Oregon Short Line Railroad, engineering department, Salt Lake City, Utah.
Osage and Oklahoma Company, Tulsa, Ind. T.
Otsego Oil and Gas Company, Otsego, Ohio.
Otto, J. A., Ottine, Tex.
Owens, Robert, Tarrant, N. Mex.
Parnell, W. A., R. F. D. 1, Neosho, Mo.
Parker, Dr. W. Bryon, Smithville, Tenn.
Patterson, E., Crookston, Minn.
Paullin, J. A., 1321 Bellefontaine avenue, Kansas City, Mo.
Pavilion Natural Gas Company, Pavilion, N. Y.
Pearson, J. H., civil engineer, U. S. War Department.
Pearson Oil and Gas Company, Ocala, Fla.
Pennsylvania Oil and Gas Company, Shawnee, Okla.
People's Oil and Gas Company, Palestine, Ill.
Perrin, Chas., Boerne, Tex.
Pfister & Vogel Leather Company, Milwaukee, Wis.
Pioneer Oil and Investment Company, Carlsbad, N. Mex.
Pratt, R. S., Lieut., U. S. A.
Priestly, Geo. C., Bartlesville, Ind. T.
Radium Oil Company, Beaumont, Tex.
Ralston, E. J., Crowder City, Ind. T.
Recruit Oil Company, Los Alamos, Cal.
Reed, A. E., Alameda Oil Company, Bartlesville, Ind. T.

Rex Mining and Smelting Company, Joplin, Mo.
 Roach, Dr. Joseph, 611 Park avenue, Baltimore, Md.
 Robinson, F. W., Youngstown, Ohio.
 Rose, C., Rosemont, Nebr.
 Rossford Oil and Gas Company, Rossford, Ohio.
 Rountree, J. D., Corona, N. Mex.
 Ruggles, G. H., Verona, Mo.
 Sanger, Chas., Bay St. Louis, Miss.
 Sandborn, T. W., Tide Water Pipe Company (Limited), Williamsport, Pa.
 Schwam, T. P., Wamego, Kans.
 Scott, W. S., Capt., U. S. A.
 Smith, W. A., Nashville, Mich.
 Smith & Swan, Independence, Kans.
 South Penn Oil Company, Pittsburg, Pa.
 Standard Knitting Mills Company, Brooklyn, N. Y.
 Sun Company, Beaumont, Tex.
 Sunflower Oil and Gas Company, Vliets, Kans.
 Swearingen, C. T., Havre, Mont.
 Tampa Waterworks, Tampa, Fla.
 Tanner, Frank P., Ouray, Colo.
 Tourney, Jeff, McPherson, Kans.
 Trujillo, Nicanor, Palma, N. Mex.
 Turkey Creek Oil Company, Westfield, Tex.
 Union Oil Company, 815 H. Hellman Building, Los Angeles, Cal.
 United Railways and Electric Company, Baltimore, Md.
 Vrooman, Howard, 423 American Bank Building, Kansas City, Mo.
 Waddell, J. M., Morrell, Ark.
 Wagner, W. W., Letts, Iowa.
 Waterloo Waterworks, Waterloo, Iowa.
 Webster, C. L., Charles City, Iowa.
 Werkeheiser-Polk Mill Company, Temple, Tex.
 Weyant, W., Alvin, Tex.
 Williams, H. C., Estancia, N. Mex.
 Worm, Wm., jr., Freistatt, Mo.
 Wood, T. B., Bonner Springs, Kans.
 Wright, John L., Pierce City, Mo.
 Wyatt, F. M., Sonora, Tex.
 Yates, W. W., Capt., U. S. A.
 Yoke & Brown, Independence, Kans.
 York, Chas. S., hydraulic engineer, Baltimore, Md.

SUMMARY OF WELL DRILLING FOR 1905.

Abbreviations used in table.

- O = owner.
 C = contractor.
 D = driller.
 M = miscellaneous source of authority, other than owner, contractor, or driller.
 L = Survey has a log.
 S = Survey has samples.
 — under "Height of water" = distance of surface of water below the well mouth.
 + in same column = distance water will rise in an open pipe above the well mouth.

*Summary of well drilling***ALABAMA.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1	Water..	Bullock.....	Perote.....	City of Perote.....	Y. T. Radford....
2	do...	Calhoun.....	Anniston, 1½ m. NW. of, sec. 1, T. 16, R. 7.	Woodstock iron works.	
3	Oil.....	Clarke.....	Jackson, 6 m. NW. of, well No. 1, Henry Bumpas farm.	Edgar Oil Co.....	W. R. Osborne....
4	do...	Colbert.....	Cherokee, ½ m. S. of, sec. 2, T. 4, R. 14.	Alabama-California Oil Co.	
5	Water..	Covington.....	Collins, ½ m. SE. of, sec. 25, T. 8, R. 16.	City of Collins....	
6	do...	Dallas.....	Selma, ½ m. NE. of.	Selma Water Co....	
7	do...	Jefferson.....	Adger.....	Marshall Howton...	
8		do.....	Belle Sumter, 1½ m. S. of	Tennessee Coal, Iron and Railroad Co.	
9	Water..	do.....	Bessemer, 2 m. W. of...	Woodward Iron Co.	Swalley & Morgan.
10	do...	do.....	Bessemer.....	do.....	Chas. Morgan....
11	do...	do.....	Mount Ilwain Spring...	Gate City Land Co.	do.....
12		do.....	Palos, 4½ m. W. of sec. 17, T. 16, R. 5.	Pratt Consolidated Coal Co.	
13	Gas.....	Madison.....	Hazlegreen, ¼ m. NE. of, well No. 6, D. A. Mosley farm, sec. 19, T. 1, R. 1 E.	New York and Alabama Oil Co.	
14	do...	do.....	Hazlegreen, No. 4.....	do.....	
15	do...	do.....	Hazlegreen, well No. 5, John Motley farm.	do.....	
16	do...	do.....	Hazlegreen, 1½ m. NE. of, well No. 7, Carter farm, sec. 18, T. 1, R. 1.	do.....	
17	Water..	do.....	New Hope, ¼ m. E. of ..	M. Elliott.....	
18		Marion.....	Brilliant, well No. 2....	Aldrich Mining Co.	
19	Water..	Marengo.....	Thomaston, ½ m. SW. of.	Southern Cotton Oil Co.	John I. Hawk....
20	do...	Mobile.....	Granite, 1 m. E. of.....	Alabama Port Co....	John A. Sutter...
21	do...	Morgan.....	Eva, 9 m. NE. of.....	N. C. Smith.....	Holmes Bros....
22	Gas.....	do.....	Hartsell.....	Cicero Thompson...	
23	Water..	Pike.....	Brundidge.....	City of Brundidge..	
24	do...	do.....	Troy, 2½ m. NW. of...	Standard Chemical Co.	Frank Sutter....
25	do...	Russell.....	Columbus, Ga., 3 m. S. of.	City of Columbus...	Perry Andrews...
26	do...	do.....	Kalo, Berry Brick Co....	do.....	
27		Tuscaloosa.....	Abernant, 1½ m. E. of...	G. B. Crome and others.	

* See detailed record at end of table.

reported in 1905.

ALABAMA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Y. T. Radford.....	D.	<i>Ft.</i> 325	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>	1904	(S.).....	1
Woodstock iron works.	O.	500	8	500			720	1887	Hard water; used at blast furnaces.	2
W. R. and G. A. Osborne.	C.	1,201						1905	Show of oil at 324-352 feet and at 504-528 feet; show of oil and gas at 702-705 feet. Considerable gas obtained; no oil.	3
O. R. Hanson.....	O.	1,618	8		-20				Show of gas and oil at 282 and 1,060 feet; water is sulphur bearing. (L.)	4
W. C. Porter.....	D.	190	8	125	-21		139	1905	Soft water; city supply.	5
John Bicksler.....	O.	655	8-6	655		175	750	1903	Iron-bearing water strata at 280, 365, and 452 feet; temperature, 70°.	6
Alfred L. Thorp...	D.	187	5½		-80			1904	Water has bad taste; not used.	7
do.....	D.	202	6		+ 1			1904	Test hole for coal; hard water; not used.	8
R. R. Swalley.....	C.	239	6	237			100	1905	(L. S.).....	9
Andy Andrews.....	C.	180	6	130			60	1905	Soft water; also at 70-73 feet. (L.)	10
Chas. Morgan.....	C.	120	6	82	+ 4	200		1898	(L.).....	11
do.....	O.	135	2½	75	Flows.				Test hole for coal; hard water.	12
H. B. Conover.....	D.	391	8-6½	67			100	1905	(L. S.).....	13
do.....	O.	310						1905	(L. S.).....	14
do.....	D.	351						1905	(S.).....	15
do.....	D.	409	6½					1905	Water at 46-50 feet, rises to 6-12 feet; 140 gallons per minute; pockets of gas at 215-220 and 255-260 feet. (L. S.)	16
Ed Cornell.....	D.	125	6	110	- 8			1905	Hard water.....	17
J. O. Heflin & Co.	M.	300						1905	(S.).....	18
John I. Hawk.....	C.	1,040	4-3	1,000		½	15	1905	(L. S.).....	19
John L. Ford.....		550	4	440	+40	135		1905	Water salty. (L.)...	20
Holmes Bros.....	D.	122	6	100	-25			1905		21
Ed Cornell.....	D.	245	7-6½	100	-20			1904	Sulphur water. (S.)	22
J. T. Sullivan.....	M.	413	4½	340	-50		30	1905		23
M. Canfield.....	O.	585	8	576	-46			1905	Well choked by sand.	24
L. B. Clay.....	M.	285	6-2	264	Flows.	18	30	1905	Soft water at 178 feet.	25
do.....	M.	160						1905	(S.).....	26
Alfred L. Thorp...	D.	186						1904	Test hole for coal.....	27

*Summary of well drilling***ALABAMA**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
28	.....	Tuscaloosa.....	Cohort, 2 m. W. of, sec. 8, T. 26, R. 18.	.....	.....
29	Water	.....do.....	Tuscaloosa.....	City of Tuscaloosa..	.....
30	do	Walker.....	Horse Creek, $\frac{3}{4}$ m. SE. of.	Red Star Coal Co...	Head & Hinz.....
31	do	Winston.....	Haleysville.....	E. B. Blanton.....	Donaldson & Jordan.
32	do	.....do.....	Haleysville, near post-office, sec. 31, T. 9, R. 10.	Borough of Haleysville.	.....
33	do	.....do.....	Haleysville, 4 m. N. of.	B. H. Drake.....	Jordan & Turner.
34	do	.....do.....	Haleysville, $\frac{1}{4}$ m. N. of post-office.	A. W. Moore.....	Donaldson & Jordan.

ARIZONA.

a 35	Water	Maricopa.....	Phoenix, 3 m. NE. of...	U. S. Indian School	.....
36	do	Pima.....	Tucson, 1 m. SW. of...	City of Tucson.....	.....

ARKANSAS.

37	Water	Arkansas.....	De Witt, sec. 4, T. 5, R. 3.	Harry Merritt.....	.....
38	do	Ashley.....	Morrell, near post-office, sec. 26, T. 15, R. 4.	J. M. Waddell.....	.....
39	do	Baxter.....	Mountain Home, public square, sec. 9, T. 19, R. 13.	Baxter County.....	W. D. Napier.....
40	do	.....do.....	Mountain Home, 12 m. N. of, sec. 27, T. 21, R. 13.	Middle Fork Mining Co.	.....do.....
41	Oil.....	Benton.....	Maysville, $3\frac{1}{2}$ m. NE. of, sec. 20, T. 34, R. 3.	Stermer Bros.....	Sterner Bros.....
42	Water	.....do.....	Siloam Springs, 5 m. S. of, sec. 31, T. 17, R. 33.	R. A. Beady.....	E. A. McQuie.....
43	do	.....do.....	Siloam Springs, 3 m. S. of, sec. 19, T. 17, R. 33.	G. W. Ford.....	.....do.....
44	do	Boone.....	Zinc, $1\frac{1}{2}$ m. N. of, sec. 17, T. 19, R. 18.	William H. Almy...	Almy Mining Co..
45	do	.....do.....	Zinc, 3 m. N. of, sec. 4, T. 19, R. 18.	Redus Lumber Co..	J. C. Fain.....
46	do	.....do.....	Zinc, near post-office, sec. 20, T. 19, R. 18.	Sugar Orchard Realty Co.	.....
47	do	Carroll.....	Berryville, $\frac{1}{2}$ m. S. of.	J. W. Freeman.....	W. H. Hodge.....
48	do	.....do.....	Berryville, $\frac{1}{4}$ m. S. of post-office.	.....do.....	I. G. Houpp.....
49	do	.....do.....	Berryville, $1\frac{1}{4}$ m. NE. of.	Oliver Murphy.....	D. B. Collins.....
51	do	Faulkner.....	Conway.....	City of Conway.....	City of Conway...
52	do	Fulton.....	Flora, $2\frac{1}{2}$ m. NW. of...	Mrs. Geo. Bleaky...	.....

a See detailed record at end of table.

reported in 1905—Continued.

ALABAMA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
A. T. West.....	M.	<i>Ft.</i> 600	<i>In.</i> 1½	<i>Ft.</i> 200	<i>Ft.</i> Flows.	.....	.....	1905	Test boring by diamond drill. (L.)	28
J. O. Heflin & Co..	D.	550	.....	.....	.....	.....	.....	1905	(S.).....	29
W. J. Hinz.....	C.	100	6	49	— 4	.....	10	1905	Water at 69 and 93 feet; hard, but used for boilers. (L.)	30
Donaldson & Jordan.	D.	109	6	88	.....	.....	.....	1905	Sulphur water.....	31
Neal Wood.....	M.	106	6½	55	— 50	.....	.....	1902	Iron-bearing water...	32
J. A. Donaldson...	D.	140	6	140	.....	.....	.....	1905	.....	33
Donaldson & Jordan.	D.	120	6	.....	.....	.....	.....	1905	Sulphur water.....	34

ARIZONA.

Frank S. Davidson	M.	200	8	162	.....	.....	.....	1905	Water at 68-70, 100-105, 162-165, 190-200 feet. (L. S.)	35
M. W. Derry.....	M.	210	360-8	47	— 17	.....	2,200	1904	Soft; water at 65, 132, and 200 feet.	36

ARKANSAS.

Gunter Bros.....	D.	101½	2	98	.....	.....	.....	.....	.....	37
Geo. Holloway....	O.	251	4-2½	210	— 15	.....	70	1905	Soft, sulphur water. (S.)	38
W. D. Napier.....	D.	102	6	42	— 15	.....	.....	1903	Hard water at 25, 40, and 60 feet.	39
.....do.....	D.	184	6	45	+ 10	.....	.....	1902	Water at 104 feet	40
Sterner Bros.....	O.	216	7-6	168	.....	.....	.....	1896	Water at 65 feet; "natural gas" at 168 feet; "oil" at 216 feet.	41
E. A. McQuie.....	C.	134	6-5	134	— 60	.....	1½	1902	Soft water.....	42
.....do.....	C.	134	6-5	134	— 70	.....	½	1904	.....	43
Almy Mining Co...	O.	200	6	30	— 20	.....	.....	1903	Prospect hole for zinc; hard water.	44
J. C. Fain.....	M.	312	7	151½	— 60	.....	.....	1904	.....	45
S. N. Towers.....	M.	150	3	.....	Flows.	.....	.....	1903	Soft water.....	46
W. H. Hodge.....	C.	170	6	40	— 3	.....	.....	1901	.....	47
I. G. Houpp.....	D.	115	6	30	.....	.....	.....	1904	Hard water.....	48
D. B. Collins.....	C.	112	6	60	— 60	.....	.....	1903	Soft water; well sometimes dry.	49
.....	.....	547	144-3	60	— 15	.....	20	1904	Soft, sulphur water; city supply.	51
G. F. Younger.....	M.	213	7-5½	209	— 55	.....	.....	1904	Hard water.....	52

Summary of well drilling

ARKANSAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
53	Water	Fulton	Flora, 1 m. SE. of	Henry Taylor	
54	Oil	do	Mammoth Spring, 3 m. W. of, sec. 11, T. 21, R. 6.	W. H. Baker	
55	Water	do	Salem, 3 m. N. of	Loneoak school	
56	do	do	Salem, 1 m. W. of	John Moss	
57	do	do	Salem, $\frac{1}{2}$ m. N. of	H. F. Northcutt	
58	do	do	Southfork, $\frac{3}{4}$ m. W. of, sec. 1, T. 19, R. 7.	W. P. Montgomery	
59	do	do	Wheeling	G. F. Younger	
60	do	Greene	Crowley's Ridge, eastern foot.		
61	do	Hempstead	Fulton, 5 m. SE. of	J. D. Conway	
62	do	do	Fulton, 6 m. NE. of, sec. 7, T. 13, R. 25.	Wm. Temple	
63	do	do	Fulton, 9 m. SE. of	do	
64	do	Izard	Wiseman	W. A. Bell	
65	do	do	Wiseman, 3 m. SW. of	J. D. Montgomery	
66	do	Johnson	Clarks ville, $\frac{1}{2}$ m. W. of	Mrs. Robt. Jarnagin	
67	do	Lawrence	Black Rock, 1 m. NW. of	Mrs. L. M. Gibson	C. B. Smith
68	do	Madison	Boston	Premier cotton mills	
69	do	Marion	Dodd City, sec. 5, T. 19, R. 17.	Nakomis Zinc Mining Co.	
70	do	do	Dodd City	do	
71	do	do	Dodd City, 4 m. E. of, sec. 1, T. 19, R. 17.	Philadelphia Zinc Co.	Woodruff Bros.
72	Water	do	Keystone, sec. 13, T. 17, R. 15.	Silver Hollow Consolidated Zinc Co.	L. C. Church
73	do	do	do	do	do
74	do	do	do	do	do
75	do	do	Rush, 1 m. N. of, sec. 3, T. 17, R. 15.	John A. Bunch	
76	do	Nevada	Emmet, near post-office.	H. Zoppa	
78	do	Phillips	Helena	Helena waterworks	
79	do	do	Helena, 8 m. NW. of	Dr. Horner	H. H. Rittman
80	do	Poinsett	Marked Tree	Chapman & Dewey Lumber Co.	Johnson & Fleming
81	do	Randolph	Ravenden Springs, $\frac{1}{4}$ m. E. of	W. Ruch	
82	Gas	Sebastian	Sec. 1, T. 8, R. 32	C. B. Wilson	
83	Water	do	Beverly, $1\frac{1}{2}$ m. NW. of	Ben Crago	T. R. Gibson
84	do	do	Central, 1 m. S. of	Edenborn	Spradling
85	Water	do	Huntington, 2 m. W. of, well No. 3.	Central Coal and Coke Co.	J. W. Young
86	Gas	do	Mansfield, sec. 32, T. 1, R. 7.		
87	do	do	Montreal, 2 m. NE. of	Quapaw Coal Co.	
88	do	do	West Hartford, $\frac{1}{4}$ m. SW. of, sec. 20, T. 4, R. 32.	Cherokee Construction Co.	

a See detailed record at end of table.

SUMMARY OF DRILLING.

37

reported in 1905—Continued.

ARKANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
G. F. Younger.....	D.	100	7-5 $\frac{1}{8}$	88				1904	(L.).....	53
R. S. McCandless..	M.	350	10		- 12			1905	Well drilled deeper, but no log below 350 feet. (L.)	54
G. F. Younger.....	D.	100	7-5 $\frac{1}{8}$	91	- 13			1904	(L.).....	55
.....do.....	D.	113	7-5 $\frac{1}{8}$	108				1904	(L.).....	56
.....do.....	D.	175	7-5 $\frac{1}{8}$	160	- 35			1904	Hard water.....	57
John Roemines.....	O.	146	5 $\frac{1}{2}$	45	- 28			1901	.....do.....	58
G. F. Younger.....	M.	169	5 $\frac{1}{2}$	160	-147			1905		59
.....do.....		105	8		- 20		75			60
C. D. Hudson.....	D.	500	2	480	Flows.	3		1905	Soft water.....	61
.....do.....	D.	320	2	300	- 26		4	1905	(L. S.).....	62
.....do.....	D.	700	3-2	680	Flows.	3		1905	Soft water. (L.).....	63
G. F. Younger.....	D.	137	7-5 $\frac{1}{8}$	112	- 77			1905	Hard water. (L.).....	64
.....do.....	D.	125	7-5 $\frac{1}{8}$	88				1905	(L.).....	65
James S. Barger.....	D.	140	6	135	- 7			1905	Iron.....	66
C. B. Smith.....	C.	127	5	117				1905	(L.).....	67
A. Goldsberry.....	D.	202						1905	(S.).....	68
.....do.....	O.	372	6	90	-145			1905	Test hole for ore.....	69
.....do.....	O.	333	6						.....do.....	70
H. J. Woodruff.....	C.	125	4 $\frac{1}{2}$					1905	Test hole. (L. S.).....	71
Joe Southard.....	C.	140	8-6	20				1904	Prospect hole for ore; water, hard.	72
.....do.....	C.	299	8-6	50				1904	.....do.....	73
.....do.....	C.	125	8-6	40				1904	.....do.....	74
John Hand.....	M.	146	7-6	142	+ 2			1905	Hard water. (L.).....	75
G. B. Hipp.....	D.	251	3 $\frac{1}{2}$	245	- 22			1905	Soft water, good supply. (L.)	76
A. Goldsberry.....	D.	492						1905	(S.).....	78
H. H. Rittman.....	D.	175	2	175	-130		7	1887	Hard water.....	79
Johnson & Fleming.	C.	398	6	366	- 3			1903	Soft water. (L.).....	80
F. L. Cook.....	D.	192	6	175	- 40			1902	Hard water. (L.).....	81
Goss & Kidd.....	M.	1,090						1905	(S.).....	82
T. R. Gibson.....	D.	148	6		-100			1902	Sulphur water.....	83
John Adams.....	D.	598	3		+ 2			1902	Test hole for coal; hard sulphur water. (L.)	84
J. W. Young.....	C.	501	6					1904	Well supplies four 125-horsepower boilers. (L.)	85
F. C. Perkins.....	O.	735						1905	(S.).....	86
John Adams.....	D.	540	3	100	+ 4			1904	Test hole for coal; soft water. (L.)	87
F. Back.....	M.	500	3		+ 1 $\frac{1}{2}$	1		1902	Soft water.....	88

*Summary of well drilling***ARKANSAS—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
89	Oil.....	Washington.....	Fayetteville, sec. 27, T. 16. R. 30.	Twentieth Century P. and M. Co.	.....
90	Water.....	.....do.....	Siloam Springs, 11 m. SE. of.	Tom Ingram.....	E. A. McQuie.....
91	.....do.....	White.....	Searcy, near post-office.	Wholesale grocery..	.....

CALIFORNIA.

a 92	Water..	Alameda.....	Alvarado, 2 m. N. of....	Alameda Sugar Co..	William H. Haley
93	.....do.....	Butte.....	Chico, 1½ m. S. of, sec. 35, T. 22, R. 1 E.	Diamond Match Co.	Diamond Match Co.
a 94	Oil.....	Fresno.....	Coalinga, 6 m. NW. of, sec. 7, T. 20, R. 15, well No. 1.	Coalinga Pacific Oil Co.	Lefever & Seavers
a 95	.....do.....	Kern.....	Bakersfield, sec. 30, T. 28, R. 28.	Orient Oil Co.....	.....
96	Water..	.....do.....	Kern, 1 m. NE. of.....	J. L. Barker.....	H. M. Lee.....
97	.....do.....	Kings.....	Angiola, 5 m. NW. of...	Levi Charles.....	Will A. Sage.....
98	.....do.....	Los Angeles.....	Los Angeles.....	Joseph Chanda.....	Teakle & Sweet-apple.
99	.....do.....	.....do.....	Alhambra.....	A. C. Weeks.....	.....
100	.....do.....	Monterey.....	Monterey, sec. 22, T. 16, R. 1 E, well No. 1.	Pacific Improvement Co.	.....
101	.....do.....	.....do.....	Monterey, well No. 2.....	.....do.....	.....
102	.....do.....	.....do.....	Monterey, well No. 3.....	.....do.....	.....
103	.....do.....	Orange.....	Esperanza.....	Anaheim Union Water Co.	H. F. Gansner.....
104	.....do.....	.....do.....	Fullerton, 8 m. SW. of, sec. 8, T. 35, R. 9.	Chas. Victor Hall...	.....
a 105	.....do.....	.....do.....	Orange, 1 m. E. of.....	City of Orange.....	.....
106	Oil.....	Fresno.....	Coalinga, sec. 7, T. 20, R. 15.	Coalinga Pacific Oil Co.	Lefever & Seavers
a 107	Water..	San Luis Obispo.	Sec. 4, T. 32, R. 19.....	D. D. Barnard.....	.....
108	.....do.....	.....do.....	Simmier, 12 m. SE. of, sec. 4, T. 32, R. 19.	West Coast Land Co	R. M. Smith.....
109	.....do.....	San Mateo.....	Menlo Park.....	J. P. Gillespie.....	.....
110	Oil.....	Santa Barbara...	Los Alamos, 5 m. NE. of, sec. 11, T. 8, R. 32, Pezzoni farm, well No. 1.	Recruit Oil Co.....	W. D. Gallagher..

a See detailed record at end of table.

reported in 1905—Continued.

ARKANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Loy & Wilson Drilling Co.	O.	<i>Ft.</i> 1,717	<i>In.</i> 10-5	<i>Ft.</i>	<i>Ft.</i> - 10	<i>Gals.</i>	<i>Gals.</i>	1902	Water at 570, 900, 1,325, and 1,635 feet; shows of gas at 445, 495, 780, and 1,190 feet.	89
E. A. McQuile.....	C.	100	6	100	- 60	.....	.....	1903	Soft water.....	90
B. P. Horton.....	D.	101	5	35	- 15	.....	.....	.....	.....	91

CALIFORNIA.

.....	C.	425	12	.....	.....	.....	.....	1904	(L.).....	92
D. C. Way.....	O.	150	8	150	- 15	.....	60	1904	(L.).....	93
Lefever & Seavers ..	C.	1,630	10-6	1,573	.....	<i>b</i> 600	.....	1905	Water at 275, 825 (sulphur water), and 1,315 feet; oil at 1,530 feet. (L.)	94
Garvin & Harris ..	D.	1,180	10-8	1,077	.....	<i>b</i> 180	.....	1901	Well No. 2; casing perforated from 1,030 to 1,163 feet. (L.)	95
H. M. Lee.....	C.	110	9½	90	- 85	.....	100	1904	(L.).....	96
W. H. Thompson..	C.	1,050	12-7½	1,050	+ 3	500	.....	1904	Water found at nine different horizons; sulphur water; used for domestic purposes and irrigation.	97
Teakle & Sweet-apple.	C.	188	12	{ 123 184 }	- 65	.....	360	1905	{ Water at 123-131 feet. (L. S.) }	98
J. C. Johnson.....	M.	294	12	248	- 185	.....	.....	1900	Yield, 135 miner's inches. (L.)	99
Wright Alsop.....	O.	108½	10	.....	- 8	.....	700	1904	(L. S.).....	100
.....	O.	130	.....	.....	- 11	.....	625	.....	(L.).....	101
.....	O.	136	.....	80	- 8	.....	625	.....	(L.).....	102
J. A. Magill.....	C.	168	12	.....	.....	.....	.....	1905	Well No. 1; surface water 1 to 32 feet, none below; well abandoned. (L. S.)	103
.....	O.	300	8-6	300	- 280	.....	.....	1905	Hard water.....	104
.....	M.	377	12	250	- 106	.....	.....	1904	Water at 120, 158, 184, 236, and 306 feet; temperature, 70°. (L.)	105
Lefever & Seavers ..	C.	1,587	10-6	.....	.....	<i>b</i> 100	.....	1905	Yields heavy oil from sand at 1,495-1,510 feet. (L. S.)	106
.....	M.	765	.....	590	.....	.....	.....	1904	(L.).....	107
R. M. Smith.....	C.	405	14-5½	118	- 32	.....	40	1905	Hard water.....	108
E. Mason.....	M.	207	.....	.....	.....	.....	.....	1903	(L.).....	109
W. D. Gallagher...	O.	2,050	.....	.....	- 40	.....	.....	1904	Dry hole; water at 140 and 1,750 feet; show of gas at 1,200 feet. (L.)	110

b Barrels a day.

Summary of well drilling

CALIFORNIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
111	Oil.....	Santa Barbara..	Orcutt, 1½ m. SE. of, sec. 15, T. 9, R. 34, Hartnell farm, well No. 1.	Union Oil Co.....	.....
112	...do.....	...do.....	Santa Maria, 9 m. s. of, T. 9, R. 34.	Brookshire Oil Co., well No. 4.	.....
113	Water..	Santa Clara.....	Mountain View.....	William A. Ackley..	.....
114	...do.....	...do.....	...do.....	Charles A. Babcock.	.....
115	...do.....	...do.....	...do.....	Fortunato Bellomi..	.....
116	...do.....	...do.....	...do.....	F. P. Beverly.....	.....
117	...do.....	...do.....	...do.....	Mrs. S. E. Boothby..	.....
118	...do.....	...do.....	...do.....	Buena Vista tract, No. 2.	.....
119	...do.....	...do.....	...do.....	Mrs. Mary A. Carroll.	.....
120	...do.....	...do.....	...do.....	...do.....	.....
121	...do.....	...do.....	...do.....	A. J. Clifford.....	.....
122	...do.....	...do.....	...do.....	James F. Cunningham.	.....
123	...do.....	...do.....	...do.....	Andrew Dahlin.....	.....
124	...do.....	...do.....	...do.....	Donelson.....	.....
125	...do.....	...do.....	...do.....	Henry Elmore.....	.....
126	...do.....	...do.....	...do.....	Adolph W. Ehrhorn.	.....
127	...do.....	...do.....	...do.....	John Erickson.....	.....
128	...do.....	...do.....	...do.....	Flint and Dimond..	.....
129	...do.....	...do.....	...do.....	D. L. Farnsworth..	.....
130	...do.....	...do.....	...do.....	Michael Farrell.....	.....
131	...do.....	...do.....	...do.....	F. J. Fallon.....	.....
132	...do.....	...do.....	...do.....	B. F. Gates.....	.....
133	...do.....	...do.....	...do.....	William Garliepp..	.....
134	...do.....	...do.....	...do.....	...do.....	.....
135	...do.....	...do.....	...do.....	C. A. Harrison.....	.....
136	...do.....	...do.....	...do.....	J. H. Hoskins.....	.....
137	...do.....	...do.....	...do.....	J. G. Jagles.....	.....
138	...do.....	...do.....	...do.....	G. W. James.....	.....
139	...do.....	...do.....	...do.....	Dr. O. P. Jenkins..	.....
140	...do.....	...do.....	...do.....	Mrs. Charlotte Johnson.	.....
141	...do.....	...do.....	...do.....	C. F. Kelley.....	.....
142	...do.....	...do.....	...do.....	W. T. Knox.....	.....
143	...do.....	...do.....	...do.....	...do.....	.....
144	...do.....	...do.....	...do.....	Charles W. Lake.....	.....
145	...do.....	...do.....	...do.....	H. D. Logan.....	.....
146	...do.....	...do.....	...do.....	C. H. Lyman.....	.....
147	...do.....	...do.....	...do.....	Mrs. Rose Macpherson.	.....
148	...do.....	...do.....	...do.....	Mercer Bros.....	.....
149	...do.....	...do.....	...do.....	Dennis Mercer.....	.....
150	...do.....	...do.....	...do.....	D. E. Morey.....	.....
151	...do.....	...do.....	Mountain View, well No. 2.	Town of Mountain View.	.....

reported in 1905—Continued.

CALIFORNIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Wm. Wilson.....	O.	2,816	12 $\frac{3}{4}$ -8 $\frac{1}{2}$				a9,000	1904	12,000 barrels in first 24 hours; initial pressure 450 pounds; no water found. (L.)	111
J. R. Bell and W. P. Alvarado.	O.	2,850	10-8				b4,000	1904	No water found.....	112
E. Mason.....	M.	107						1898	(L.).....	113
do.....	M.	110						1904	(L.).....	114
do.....	M.	170						1900	(L.).....	115
do.....	M.	117						1898	(L.).....	116
do.....	M.	131						1899	(L.).....	117
do.....	M.	254	10					1905	(L.).....	118
do.....	M.	190						1897	(L.).....	119
do.....	M.	273						1898	(L.).....	120
do.....	M.	100						1901	(L.).....	121
do.....	M.	277						1904	(L.).....	122
do.....	M.	119						1902	(L.).....	123
do.....	M.	269						1903	(L.).....	124
do.....	M.	120						1902	(L.).....	125
do.....	M.	241 $\frac{1}{2}$						1898	(L.).....	126
do.....	M.	119						1905	(L.).....	127
do.....	M.	170						1898	(L.).....	128
do.....	M.	155						1896	(L.).....	129
do.....	M.	164						1897	(L.).....	130
do.....	M.	101						1896	(L.).....	131
do.....	M.	108						1898	(L.).....	132
do.....	M.	192	10					1898	(L.).....	133
do.....	M.	169	10					1899	(L.).....	134
do.....	M.	239 $\frac{1}{2}$						1903	(L.).....	135
do.....	M.	114						1898	(L.).....	136
do.....	M.	170						1904	(L.).....	137
do.....	M.	115						1904	(L.).....	138
do.....	M.	140						1903	(L.).....	139
do.....	M.	114						1899	(L.).....	140
do.....	M.	123						1896	(L.).....	141
do.....	M.	279						1903	(L.).....	142
do.....	M.	101						1904	(L.).....	143
do.....	M.	108						1904	(L.).....	144
do.....	M.	107						1904	(L.).....	145
do.....	M.	117						1903	(L.).....	146
do.....	M.	200						1902	(L.).....	147
do.....	M.	299						1899	(L.).....	148
do.....	M.	154						1904	(L.).....	149
do.....	M.	132						1899	(L.).....	150
do.....	M.	303						1904	(L.).....	151

a Barrels a day, after 120 days.

b Barrels a day.

*Summary of well drilling***CALIFORNIA**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
152	Water..	Santa Clara.....	Mountain View, well No. 1.	Town of Mountain View.	
153	...do...	...do.....	Mountain View.....	Mrs. Grace Odell..	
154	...do...	...do.....	do.....	Pacific Press Publishing Co.	
155	...do...	...do.....	do.....	A. J. Robinson.....	
156	...do...	...do.....	do.....	N. W. Silsby.....	
157	...do...	...do.....	do.....	Mrs. Mary Shane Smith.	
158	...do...	...do.....	do.....	Somers & Co.....	
159	...do...	...do.....	do.....	Mrs. R. Sorrell.....	
160	...do...	...do.....	do.....	Southern Pacific R. Co.	
161	...do...	...do.....	do.....	Sunnyvale Cooperative Fruit Co.	
162	...do...	...do.....	do.....	George Swall.....	
163	...do...	...do.....	do.....	J. Tughton.....	
164	...do...	...do.....	do.....	A. Vargas.....	
165	...do...	...do.....	do.....	Mrs. Ellen Willey..	
^a 166	...do...	...do.....	Sunnyvale, 1½ m. N. of..	Frederick Penton, jr.	George A. Free...
167	...do...	...do.....	Sunnyvale 2½ m. N. of..	Frederick Penton...	do.....
168	...do...	...do.....	Sunnyvale, 1½ m. N. of..	Mr. Spink.....	
169	...do...	...do.....	Sunnyvale, ¾ m. N. of...	C. H. Parcell.....	Geo. A. Free.....
170	...do...	...do.....	Sunnyvale, 1½ m. N. of..	Frederick Penton...	
171	...do...	Tulare.....	Portersville, 1 m. N. of..	Gus Lang.....	H. M. Lee.....
^a 172	...do...	...do.....	Portersville, 4 m. S. of, sec. 18, T. 22, R. 28.	G. H. Russell.....	do.....
173	...do...	Ventura.....	Ventura, ½ m. SE. of post-office.	C. L. Chrisman.....	
^a 174	...do...	...do.....	Ventura.....	Mound Water Co...	
175	...do...	...do.....	Ventura, 2½ m. SE. of...	Dixie Thompson...	A. Palm & Sons..
176	Gas.....	...do.....	do.....	do.....	do.....
177	Water..	Yuba.....	Marysville.....	Marysville Water Co.	

^a See detailed record at end of table.

reported in 1905—Continued.

CALIFORNIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
E. Mason.....	M.	310						1904	(L.).....	152
.....do.....	M.	111½						1903	(L.).....	153
.....do.....	M.	291						1904	(L.).....	154
.....do.....	M.	118						1898	(L.).....	155
.....do.....	M.	130½						1902	(L.).....	156
.....do.....	M.	130						1901	(L.).....	157
.....do.....	M.	272						1900	(L.).....	158
.....do.....	M.	125½						1905	(L.).....	159
.....do.....	M.	100						1902	(L.).....	160
.....do.....	M.	114						1903	(L.).....	161
.....do.....	M.	215						1901	(L.).....	162
.....do.....	M.	365						1899	(L.).....	163
.....do.....	M.	257						1903	(L.).....	164
.....do.....	M.	113						1902	(L.).....	165
G. A. Free.....	C.	360	7	358		200		1905	Water strata at 12-14, 18-24, 66-68, 81-83, 178-182, and 270-281 feet. (L.)	166
.....	C.	179	7	171		300		1904	Unusually large flow for depth and location. (L., S.)	167
Geo. A. Free.....	D.	360	7	212		200		1905	Water at 90, 94, 212, and 215 feet. (L., S.)	168
.....do.....	C.	230	7	213		200		1905	7 water-bearing strata. (L., S.)	169
.....do.....	D.	185	7	182		350		1904	Water at 12-16 and 182-185 feet. (L., S.)	170
H. M. Lee.....	C.	115	7		- 5			1905	Water at 80 feet. (L., S.)	171
.....do.....	C.	160	11				135	1905	Soft water at 110-120 and 155-160 feet. (L., S.)	172
A. Palm & Sons...	D.	780	12-10	716	+14	315	850	1905	Water also at 490-520 feet; slightly hard. (S.)	173
Steele Bros.....		490						1905		174
Palm Bros.....	C.	640	12			630	1,100	1903	Water at 490-532, 568-578, and 615-628 feet. (L.)	175
.....do.....	C.	320						1905	Well yields 19,200 cubic feet of gas per day; one-half barrel of oil. (L.)	176
Albert E. Kingman.	M.	250½	12					1905	(L.).....	177

*Summary of well drilling***COLORADO.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
178	Water	Denver	Denver, 10 m. E. of	Wm. Betz	T. Carlton Koogle
179	do	Fremont	Canyon, 3 m. NE. of, sec. 26, T. 18, R. 70.	Canyon City Sanitarium	
180	do	do	Canyon, 5 m. S. of, sec. 21, T. 19, R. 70 W.	Colorado Springs and Florence Oil and Coal Co.	
181	do	do	Chandler, $\frac{1}{2}$ m. SW. of, sec. 28, T. 19, R. 70, No. 1 Devier well.	do	
182	do	do	Chandler, $\frac{1}{2}$ m. SW. of, sec. 34, T. 19, R. 70, No. 2 Stermes well.	do	
183	do	do	Chandler, 1 m. W. of, sec. 21, T. 19, R. 70.	G. R. Gwillim	
a 184	Water	do	Florence, 6 m. N. of, sec. 26, T. 18, R. 69.	R. G. Brown and Thos. S. Harrison.	
185	Oil	do	Florence	Birmingham Oil Co.	
186	Water	La Plata	Durango, 5 m. SE. of, sec. 35, T. 35, R. 9.		
187	Oil	do	Durango, 10 m. E. of, sec. 21, T. 35, R. 8.	C. E. Hampton	
188	Water	do	Durango, 12 m. E. of	J. W. Waters	Bert Buell
189	do	Las Animas	Delhi station	Atchison, Topeka and Santa Fe Rwy.	
190	do	do	Las Animas	do	
191	do	do	Thatcher	do	
192	do	do	Tyrone station	do	
a 193	do	Pueblo	Swallows, 8 m. SE. of, sec. 5, T. 21, R. 66.	E. I. Dupont Co.	

CONNECTICUT.

194	Water	Fairfield	Greenwich, 4 m. N. of	Emil L. Boas	Artesian Well and Supply Co.
195	do	do	Norwalk, 5 m. NE. of	F. M. Comstock	E. N. Sipperley
196	do	do	Norwalk	St. Mary's Hospital	
197	do	do	South Norwalk, $\frac{1}{4}$ m. W. of	M. M. Lee	
198	do	do	Southport, 1 m. N. of	Dr. W. B. Graves	
199	do	Hartford	Hartford, $\frac{1}{2}$ m. NE. of	Dillon & Douglas	
200	do	New Haven	Beacon Falls	Beacon Falls Rubber Co.	C. F. Underwood
201	do	do	Cheshire, $\frac{1}{4}$ m. N. of	Walter Scott	
202	do	do	Menden, 1 m. W. of	Henry Fiest	
203	do	do	Middlebury, $\frac{1}{2}$ m. S. of	C. G. Atterton	F. A. Champlin

a See detailed record at end of table.

reported in 1905—Continued.

COLORADO.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Wm. Handley.....	C.	450	5-4	430	Flows.	5	.....	1905	(L.).....	178
Atlas Oil Co.....	M.	1,670	10-6	1,650	-50	3,365	.....	1905	Water also at 800 feet; soft sulphur bearing; temperature 98½°. Hazzard well.	179
Isaac Jones and Robert James.	O.	360	8½-5	300	.....	350	.....	1902	(L.).....	180
Joe Able and M. Syfar.	O.	1,075	4½	920	+ ½	.....	.....	1900	Water soft; contains iron and sulphur; not used.	181
Robert James and B. Munn.	O.	487	8½	487	+ ½	.....	4	1902	Water at 212 and 316 feet, soft; contains a little iron and sulphur; not used.	182
Robert James and Isaac Jones.	O.	364	8½	358	+ ½	.....	.....	1903	Water soft; contains iron; not used.	183
Geo. Schaffer.....	O.	1,230	5½	1,210	+80	360	.....	1905	Hard water. (L.)....	184
J. A. Patterson....	O.	1,000	.....	.....	.....	.....	.....	1905	(S.).....	185
G. W. Spencer.....	D.	410	6½	355	+22	25	.....	1904	Soft sulphur water...	186
C. B. Buell.....	O.	765	6½	275	Flows.	.....	.....	1903	Sulphur water; shows of oil at 500 and 700 feet.	187
Bert Buell.....	D.	187	5½	150	.....	210	.....	1903	.....	188
C. H. McVay.....	O.	321	10-8½	305	.....	.....	37	1901	Water at 130-176 and 222-305 feet. (L.)	189
.....do.....	O.	360	12-8½	333	.....	.....	.....	1899	Soft water at 20, 90, and 240 feet. (L.)	190
.....do.....	O.	330	.....	240	.....	.....	5	1901	Well a failure. (L.)..	191
.....do.....	O.	580	10-6½	490	.....	.....	50	1902	Water at 435-480 and 490-577 feet. (L.)	192
Guillinger & Heskick.	M.	796	10-6	.....	Flows.	30	150	1905	Water at 265, 535, 580, 675, and 700 feet. (L.)	193

CONNECTICUT.

A. Ray.....	O.	300	8	.....	± 0	.....	12	1905	(L. S.).....	194
E. N. Sipperley....	D.	159	6	.....	.....	.....	15	1905	Water at 68-75 and 138-155 feet. (L. S.)	195
.....do.....	D.	250	6	.....	.....	.....	.....	1905	(S.).....	196
.....do.....	D.	136	.....	.....	.....	.....	.....	1905	(L. S.).....	197
.....do.....	O.	302	6	.....	- 8	.....	½	1905	(L. S.).....	198
H. B. King.....	D.	250	8	250	-50	.....	40	1905	Hard water. (L.)....	199
C. F. Underwood...	C.	100	8-6	65	.....	.....	15	1905	Water at 65-85 feet. (L. S.)	200
Floyd Wright.....	D.	140	6	120	-22	4	.....	1905	Water at 30, 60, and 80 feet.	201
Ernest Lyon.....	D.	106	.....	103	.....	.....	1	1905	Soft water. (L.)....	202
.....do.....	D.	116	6	.....	- 4½	.....	3	1905	Water at 90-96 and 113-116 feet. (L. S.)	203

Summary of well drilling

CONNECTICUT—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
204	Water..	New Haven	Middlebury, 2 m. E. of..	F. S. Chase.....	F. A. Champlin...
205	...do...	...do.....	Waterbury.....	Pine Grove Cemetery.	.....

DELAWARE.

a 207	Water..	Newcastle.....	Fort Dupont.....	United States.....	Thos. B. Harper..
208	...do...	...do.....	...do.....	...do.....	...do.....
209	...do...	...do.....	...do.....	...do.....	.....

FLORIDA.

210	Water..	Alachua.....	Alachua, $\frac{1}{4}$ m. W. of....	Diamond Ice Co....	W. F. Hamilton..
211	...do...	...do.....	Dutton, $1\frac{1}{2}$ m. W. of, sec. 24, T. 9, R. 16.	Dutton Phosphate Co.	Claud B. Anderson
212	...do...	Brevard.....	East Eau Gallie, sec. 21, T. 27, R. 37.	Mrs. Mary Young..	.....
213	...do..	...do.....	Eau Gallie, $\frac{1}{4}$ m. N. of, sec. 16, T. 27, R. 37.	I. R. & L. W. Fish and Ice Co.	.....
214	...do...	...do.....	Eau Gallie, sec. 21, T. 27, R. 37.	Mary Young.....	.....
215	...do...	Citrus.....	Floral City, $1\frac{1}{2}$ m. W. of, sec. 16, T. 20, R. 20.	Bradley Phosphate Co.	.....
216	...do...	...do.....	Floral City, $1\frac{1}{2}$ m. SW. of sec. 16, T. 20, R. 20.	Floral City Phosphate Co.	.....
217	...do...	...do.....	Hernando, 1 m. NW. of..	Pearson & Sexton...	J. D. Allen.....
218	...do...	Duval.....	East Mayport.....	Florida East Coast R. R.	.....
219	...do...	...do.....	Jacksonville.....	Armour & Co.....	.....
220	...do...	...do.....	Jacksonville, $1\frac{1}{2}$ m. NE. of.	R. F. Barker.....	.....
221	...do...	...do.....	Jacksonville, $\frac{1}{2}$ m. E. of.	J. E. T. Bowden...	.....
222	...do...	...do.....	Jacksonville, $1\frac{1}{2}$ m. S. of.	City of Jacksonville.	Sydnor Pump and Well Co.
a 223	...do...	...do.....	...do.....	...do.....	.....
224	...do...	...do.....	Jacksonville, $1\frac{1}{2}$ m. E. of.	Fairfield Water Co..	.....

a See detailed record at end of table.

reported in 1905—Continued.

CONNECTICUT—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Ernest Lyon.....	D.	<i>Ft.</i> 285	<i>In.</i> 6	<i>Ft.</i>	<i>Ft.</i> -24	<i>Gals.</i>	<i>Gals.</i> 10½	1905	At 160 feet, 5 gallons per minute; at 220 feet, 10½ gallons. (L.S.)	204
do.....	D.	123	6	.....	.....	.....	.....	1905	(L.).....	205

DELAWARE.

.....	M.	762	8	720	.....	.....	.....	1905	Well abandoned. (L. S.)	207
.....	M.	742	8	720	Flows.	2½	20	1905	Well flows at high tide; at low tide water stands at -6 feet; water has brownish-yellow color, alkaline reaction, sulphur odor.	208
.....	M.	740	6	720	do..	12	149	.....	Water like preceding; shows tidal fluctuation.	209

FLORIDA

H. E. Smith.....	D.	270	8	.....	.....	.....	88	1905	Water at 50-120 and 250-270 feet. (L.S.)	210
C. B. Anderson....	M.	180	12	50	-50	.....	600	1905	Hard water. (L.)....	211
Alex. Near.....	D.	315	.....	.....	.....	.....	.....	1905	(S.).....	212
do.....	D.	333	4	230	+30	.....	.....	1905	Sulphur water. (L. S.)	213
do.....	D.	315	2	230	+25	.....	.....	1905	Fresh water at 30 feet; sulphur water at 230 feet. (L.S.)	214
A. C. Johnson.....	D.	140	8	138	.....	.....	1,200	1900	Hard sulphur water..	215
do.....	D.	130	8-6	130	-32	.....	800	1895	Water hard, slightly sulphur bearing; used for washing phosphate rock.	216
J. O. Edson.....	D.	106	12	95	-35	.....	.....	1905	Hard sulphur water. (L.)	217
H. Walker.....	D.	495	8-4	418	- 2	.....	.....	.....	Water at 350 feet	218
Hugh Partridge...	O.	685	4	650	+40	300	.....	1902	Hard sulphur water.	219
.....	O.	525	4	.....	+55	.....	.....	1885	do.....	220
E. F. Joyce.....	O.	652	6	.....	+30	.....	.....	.....	Hard sulphur water; used for public supply.	221
F. R. Miller.....	M.	984	10	954	+52	1,215	.....	1905	Hard sulphur water. at 524-750 feet. (L. S.)	222
R. N. Ellis.....	M.	980	10	865	+58	1,380	.....	1903	Hard sulphur water; part of city supply. (L.)	223
B. F. Partridge....	M.	500	8	500	+45	.....	.....	1892	Hard sulphur water; flow sold with that of a 3-inch well of same depth.	224

Summary of well drilling

FLORIDA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contracter.
225	Water	Duval	Jacksonville, $\frac{1}{2}$ m. S. of	Jacksonville Electric Co.	
226	do	do	Jacksonville	Merrill Stevens	
227	do	do	Jacksonville, $1\frac{1}{2}$ m. N. of	People's Ice Co.	
228	do	do	Jacksonville, $\frac{1}{2}$ m. W. of	Refrigerator Ice Co.	
229	do	do	do	do	
230	do	do	Jacksonville	Windsor Hotel	
231	do	do	Jacksonville, $\frac{3}{4}$ m. SW. of	Laura Wurts	
232	Oil	Escambia	Cantonment	Southern States Lumber Co.	Frank Sutter
233	Water	do	Pensacola, $4\frac{1}{2}$ m. SW. of	Lee & Co.	
234	do	Hernando	Istachatta, 3 m. SW. of	J. D. Allen	
235	do	Gadsden	Quincy, $\frac{1}{2}$ m. N. of	Town of Quincy	
236	do	Hillsboro	Tampa	Tampa Waterworks Co.	
237	do	do	West Tampa	West Tampa waterworks.	W. F. Hamilton
238	do	Jackson	Graceville, $\frac{1}{2}$ m. W. of, sec. 35, T. 6, R. 13.	Graceville Electric Light and Water Co.	White & Edwards
239	do	do	Campbellton, $\frac{1}{2}$ m. W. of	Z. F. Stallings	
240	do	Lake	Eustis, near post-office.	Arthur Downing and S. S. Smith.	Dibble & Ernest.
241	do	do	Eustis, on Bay street.	E. L. Ferran & Co.	
242	do	Levy	Cedar Key	C. B. Rogers and E. A. Champlain.	B. A. Coachman
243	do	Marion	Dunnellon, near post-office.	City of Dunnellon	
244	do	Putnam	Palatka, 4 m. N. of	Jas. A. Bear	H. Merwin
245	do	do	Palatka, 1 m. W. of	M. Griffin & Co.	do
246	do	do	Palatka	C. H. Kennerly	
247	do	do	Palatka, 15 m. N. of	R. W. Mattox	H. Merwin
248	do	do	Bostwick	J. W. Glisson	do
249	do	do	Penial, near post-office, sec. 23, T. 10, R. 26.	W. A. Williams & Co.	
a-250	Oil	Sumter	Sumterville, $2\frac{1}{2}$ m. S. of	Pearson Oil and Gas Co.	

a See detailed record at end of table.

reported in 1905—Continued.

FLORIDA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Hugh Partridge...	O.	<i>Ft.</i> 750	<i>In.</i> 12-10	<i>Ft.</i> 385	<i>Ft.</i> +47	1,500	.....	1903	Hard sulphur water; power-house supply.	225
.....do.....	O.	669	6	500	+62	800	.....	1889	Hard sulphur water; used for boilers; also for drinking water on vessels.	226
.....do.....	O.	628	6-5	.....	Flows.	.....	.....	1900	Hard sulphur water.	227
W. S. Ware.....	O.	658	6	630	+62	.....	.....	1886	Water at 450 feet; hard sulphur water.	228
.....do.....	O.	744	6	630	+56	.....	.....	1902	Water at 450 feet; hard sulphur water. (L.)	229
.....	O.	900	8	.....	+30	.....	.....	.....	Hard sulphur water..	230
.....	M.	689	6	650	Flows.	.....	.....	1886	.....do.....	231
Frank Sutter.....	D.	1,452	.....	.....	.....	.....	.....	1905	Dry hole. (L. S.)....	232
W. C. Le Gallais..	D.	1,011	.....	.....	.....	.....	.....	1905	(S.).....	233
J. Edson.....	D.	113	5	109	-54	.....	60	1905	Water hard, but used in boilers and for village supply. (S.)	234
.....	M.	940	10-6	940	.....	.....	200	1905	Sulphur water.....	235
G. R. Martin.....	.....	320	.....	.....	.....	.....	.....	1905	(S.).....	236
J. A. Matthews....	D.	340	6	.....	.....	.....	.....	1904	Hard sulphur water. (S.)	237
C. E. Edwards.....	O.	248½	8-6	248	- 2	.....	500	1905	Water-bearing beds from 160 feet to bottom; water hard. (L. S.)	238
White & Edwards..	D.	198	6	170	-25	.....	.....	1905	Sulphur water.....	239
E. D. Ernest.....	C.	123	5½	123	.....	.....	12	1905	.....	240
Brotherson.....	O.	172	4	.....	- 2	.....	600	1902	Sulphur water.....	241
.....	M.	830	4	.....	- 8	.....	.....	.....	Salt water; strong brine at bottom; not used. (L.)	242
J. O. Edson.....	D.	155	8	98	-19	.....	Large	1905	Hard water; city supply. (L.)	243
H. Merwin.....	D.	230	4	230	+20	.....	.....	1905	Hard, sulphur water..	244
.....do.....	D.	187	4	187	+20	125	.....	1904	Hard, sulphur water. (L.)	245
.....do.....	O.	238	4	238	+16	.....	.....	1902	Hard, sulphur water; also at 40 and 80 feet.	246
.....do.....	C.	196	3	.....	+25	.....	.....	1905	(S.).....	247
.....do.....	D.	248	3	248	+25	.....	.....	1905	Hard, sulphur water..	248
.....do.....	O.	238	3	.....	Flows.	.....	.....	.....	Sulphur water.....	249
.....	O.	2,002	10	.....	- 2	.....	.....	1903	Much hard sulphur water to 650 feet; black sulphur water at 1,386-1,400 feet; several shows of oil reported. Drilling stopped by loss of tools. (S.)	250

*Summary of well drilling***FLORIDA**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
^a 251	Water..	Volusia.....	Deland.....	City of Deland	W. F. Hamilton..
^a 252	....do....	....do.....	Ormond, sec. 14, T. 14, R. 32.	Florida East Coast Hotel Co.	Horace Walker...

GEORGIA.

253	Water..	Burke.....	Waynesboro, $\frac{1}{2}$ m. E. of.	J. I. Linler.....	.....
^a 254	....do....	Chatham.....	Savannah, 3 m. W. of....	Mutual Fertilizer Co.	Hughes Specialty Well Drilling Co.
^a 255	....do....	Decatur.....	Lela, well No. 3, saw- mill farm.	Chattahoochee Lumber Co.	....do.....
^a 256	....do....	Fulton.....	Fort McPherson.....	United States.....	Perry Andrews...
257	....do....	Glynn.....	Everett City.....	R. H. Everett.....	.....
^a 258	....do....	Pierce.....	Offerman, near post- office.	Southern Pine Co....	Hughes Specialty Well Drilling Co.
259	....do....	Tattnall.....	Collins.....	Pine Product Co....	W. F. Hamilton..
^a 260do....do.....	Claxton, near post- office.	N. H. Thaggard.....	Hughes Specialty Well Drilling Co.

IDAHO.

261	Water..	Canyon.....	Nampa, 7 m. SE. of	Leonard Griffith
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ILLINOIS.

262	Water..	Adams.....	Coatsburg, $2\frac{1}{2}$ m. SW. of.	County poor farm..	J. B. Dunant.....
263do....do.....	Lima, $2\frac{1}{2}$ m. NE. of, sec. 6, R. 8.	C. S. Vinson.....
264	....do....	Brown.....	Mount Sterling, 1 m. NE. of.	E. Ford.....	.....
265	....do....	....do.....	Mount Sterling, $1\frac{1}{4}$ m. NW. of.	Wm. Ford.....	.....
^a 266	....do....	....do.....	Mount Sterling, 3 m. W. of, sec. 1, T. 1.	Andy Market.....	Jos. Simmons, jr..
267	....do....	Champaign.....	Longview, 4 m. NW. of.	Mrs. Mary Waldo....	.....
268	Water..	....do.....	Philo.....	Elliot Doss.....	Ordell Bros.....
269	....do....	....do.....	....do.....	Dr. J. M. Tensley....	.....
270	....do....	Clark.....	Parker township.....	Hatton & Winchell..	.....
271	....do....	....do.....	Westfield, $2\frac{1}{2}$ m. SE. of, on Elder Lee farm.	Citizens Oil Co....	.....
272	Water..	Clay.....	Flora, $\frac{1}{2}$ m. N. of.....	Flora Ice and Cold Storage Co.	.....
273	....do....	....do.....	Xenia.....	Village of Xenia....	.....
274	....do....	Coles.....	Lerna, 2 m. SE. of, sec. 12, T. 11, R. 8.	G. T. Balch.....	.....

^a See detailed record at end of table.

SUMMARY OF DRILLING.

51

reported in 1905—Continued.

FLORIDA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
H. E. Smith.....	C.	<i>Ft.</i> 264	<i>In.</i> 10	<i>Ft.</i> 207	<i>Ft.</i> — 27	.....	.....	1905	Water at 80-135 and 160 feet. (L. S.)	251
Horace Walker....	M.	352	10	.....	— 2	.....	.....	1905	Abandoned. (L. S.)	252

GEORGIA.

H. F. Loyd.....	O.	249	6	160	+ 4½	20	75	1905	Soft water.....	253
Henry Shoates....	C.	330	.8	310	— 4	.....	.....	1905	Surface water to 30 feet; water at 235-240 and 280-330 feet. (L. S.)	254
W. J. Hughes.....	D.	918	6-2	737	— 10	.....	15	1905	(L. S.).....	255
Perry Andrews....	M.	452	10	.....	— 30	.....	45.6	1905	Water at 130, 165, 365, and 385 feet. (L. S.)	256
Clay.....	M.	500	3-2	200	+ 30	.....	.....	1895	Soft, sulphur water...	257
Claude Roberts....	C.	675½	8-6	640	— 33	.....	250	1905	Water at 60-70, 460-480, and 640-675½ (main supply) feet; temperature, 76° F. (L. S.)	258
B. Z. Matthews....	M.	180	.....	.....	.....	.....	.....	1905	(S.).....	259
Hughes Specialty Well Drilling Co.	C.	546½	8-6	— 80	100	1905	Surface water at 10-30 feet; supply from 460-505 and 510-546½ feet. (L. S.)	260

IDAHO.

Chas. A. Peters....	D.	200	8-6½	185	— 160	1904	Hard water.....	261
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ILLINOIS.

J. B. Dunant.....	D.	165	5½	161	— 36	40	1891	Soft water.....	262
C. S. Vinson.....	300	5½	298	— 160	1896	Iron-bearing water. (L.)	263
Jos. Simmons, jr...	O.	480	10-5½	470	— 135	.....	.....	1905	Soft water; water at 40 and 165 feet.	264
John B. Dunant...	D.	477	8-5½	470	— 140	.....	20	1905	Soft water. (L.).....	265
Jos. Simmons, jr...	C.	235	5½	225	— 80	.....	2	1905	(L. S.).....	266
D. F. Vangundy...	D.	235	2-1¼	225	.....	.....	4	.....	Soft water.....	267
.....do.....	D.	125	2-1¼	120	.....	.....	3	1905	Soft water. (L.).....	268
.....do.....	D.	131	2-1¼	126	— 20	.....	5	1905	Soft water. (S.).....	269
Welles Kenyon....	D.	363	.....	.....	.....	.....	.....	1905	(S.).....	270
Jas. T. Shugart....	D.	333	.....	.....	.....	.....	.....	1905	do.....	271
M. S. Wyman.....	D.	250	8-6½	140	— 20	.....	15	1903	(L.).....	272
J. W. Fincher.....	D.	120	4-3	115	— 25	.....	5	1898	Hard water.....	273
G. T. Balch.....	D.	115	2	115	— 24	.....	4	1890	Iron-bearing water. (L.)	274

Summary of well drilling

ILLINOIS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
275	Water	Coles	Lerna, 1 m. NE. of, sec. 2, T. 11, R. 9.	Lewis W. Bohlander	
276	do	do	Lerna, 2½ m. E. of, sec. 1, T. 11, R. 8.	Chas. H. Faris	
277	do	do	Lerna, 1½ m. E. of, sec. 12, T. 11, R. 8.	Thos. C. Faris	
278	Water	do	Lerna, T. 11, R. 8.	Village of Lerna	
279	Oil	do	Loxa, 2½ m. N. of, J. M. Burguer farm.		
^a 280	Water	Cook	Doltons	Village of Doltons	L. Wilson Well Co.
281	do	do	Evanston		
^a 282	do	do	Galewood	Chicago, Milwaukee and St. Paul Rwy.	J. P. Miller Artesian Well Co.
283	do	do	Morton Grove	Poehlman Bros.	
^a 284	Oil	Crawford	Sec. 28, T. 7, R. 12.		
^a 285	do	do	Flat Rock, ¼ m. NE. of, sec. 6, T. 7, R. 11.	W. J. Jones	Creswell Bros
286	Gas	do	Palestine, ¼ m. SE. of, T. 6, R. 11.	Wabash Valley O., G., and M. Co.	
287	Water	Douglas	Villa Grove, 2 m. NE. of.	Dr. C. L. Van Doren	W. H. Ordel
288	do	Ford	Sibley, sec. 35, T. 25, R. 7.	Village of Siscoe	W. H. Schuler
289	do	Fulton	Fiatt, 4½ m. NW. of	M. Dodson	
291	do	Grundy	Minooka	S. Ferguson	
292	Water	do	Morris, 3 m. NE. of	Estate of Tod Collins	
293	do	Hancock	Bowen, 5 m. NW. of	John Graham	
294	do	do	Colusa, 1½ m. SW. of, sec. 27, T. 7, R. 7.	P. A. Hubbard	E. R. Lionberger
295	do	do	La Harpe, 5½ m. SW. of, sec. 36, T. —, R. 5.	Thos. Bustard	
296	do	do	La Harpe, 4 m. SW. of, sec. 31, T. 7, R. 5.	Geo. Campbell	
297	do	do	La Harpe, sec. 18, T. 7, R. 5.	S. Meseler	
298	do	do	La Harpe, 1½ m. SW. of, sec. 33, T. 7, R. 5.	J. S. Nudd	
299	do	do	Plymouth, near post-office.	City of Plymouth	
300	do	do	Pontoosuc, 1 m. N. of, sec. —, T. 7, R. 7.	Theodore Kidson	
^a 301	do	do	Warsaw, 2½ m. SE. of, sec. 13, T. 4, R. 9.	Col. B. F. Marsh	Haggerty & Skog
302	do	do	West Point, 2½ m. SW. of.	D. H. Dickerson	J. B. Dunant
303	do	do	West Point, 2 m. NE. of.	A. T. Graham	

^a See detailed record at end of table.

reported in 1905—Continued.

ILLINOIS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Chas. H. Faris.....	O.	142	2	142	— 42	.....	.....	.....	Sulphur water.....	275
.....do.....	D.	121	2	121	— 60	.....	7	1901	Contains iron. (L.)..	276
Geo. T. Balch.....	O.	115	2	105	— 20	.....	.....	1893	.....do.....	277
.....	M.	126	24-18	126	— 50	.....	3	1898	Soft water.....	278
.....	M.	1,800	.....	.....	.....	.....	.....	1905	Salt water at 500 feet.	279
H. W. Hambrecht and H. Hemhoff.	D.	1,312	12-6 $\frac{3}{16}$	.....	.....	.....	186	1905	Poor water at 57-60 feet; good water below 1,000 feet. (L. S.)	280
Henry Heinz.....	D.	226	8	.....	— 14	.....	5	.....	.....	281
.....	O.	1,819	10 $\frac{1}{2}$ -5	.....	— 84	.....	.....	.....	(L.).....	282
Henry Heinz.....	D.	184	6	184	— 18	.....	40	.....	Soft water.....	283
.....	M.	1,345	.....	.....	.....	.....	.....	1904	Salt water at 880, 1,110, and 1,174 feet. Gas at 970 and 1,184 feet. Dry hole. (L.)	284
.....	C.	1,540	10-4 $\frac{7}{8}$	.....	.....	.....	.....	1905	Large flow of fresh water at 450 feet; salt water at 780 and 1,100 feet; small show of oil at 1,535 feet. (L.)	285
J. L. Walker.....	O.	651	10-6 $\frac{1}{2}$	350	+ 0	.....	.....	1904	Water at 22 feet; salt water at 350 feet; gas at 651 feet, 290 pounds pressure.	286
D. F. Vangundy....	D.	190	2	190	Flows.	$\frac{1}{4}$	5	1904	Soft water at 60-65 and 90-96 feet. (L.)	287
Elbert Siscoe.....	C.	120	5	100	.....	.....	15	1905	(L.).....	288
M. Dodson.....	O.	245	3	240	—120	.....	.....	1898	Very soft water.....	289
Albert Patten.....	D.	110	4	110	— 40	.....	10	.....	Soft water.....	291
E. C. Thompson....	D.	526	6-4	450	Flows.	.....	.....	1894	Soft water; water at 95 feet. (L.)	292
John B. Dunant....	D.	250	5 $\frac{5}{8}$	245	— 18	.....	20	1889	Soft water. (L.).....	293
E. R. Lionberger....	C.	214	4 $\frac{1}{2}$	205	— 75	.....	7	1905	Mineral water. (L.)	294
George Campbell...	D.	226	5 $\frac{5}{8}$	226	— 8	.....	16	.....	Mineral water.....	295
.....do.....	O.	256	5 $\frac{5}{8}$	254	— 20	.....	6	1902	Water medium soft. (L.)	296
.....do.....	D.	280	5 $\frac{5}{8}$	270	— 36	.....	16	1902	Hard water; small flow at 36 feet.	297
Frank Tweedy.....	O.	147	6	65	— 12	.....	.....	1901	Soft water. (L.).....	298
James Smith.....	D.	297	5 $\frac{5}{8}$	294	— 80	.....	.....	1895	Hard water.....	299
E. R. and S. W. Lionberger.	D.	131	5 $\frac{5}{8}$	128	— 28	.....	2	1905	.....	300
Jno. Skog.....	C.	340	6	325	.....	.....	10	1904	(L.)	301
J. B. Dunant.....	D.	220	5 $\frac{5}{8}$	220	.....	.....	30	1893	Soft water. (L.).....	302°
.....do.....	D.	198	5 $\frac{5}{8}$	198	— 30	.....	40	1888	Soft water.....	303

Summary of well drilling

ILLINOIS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
304	.....	Jaspr.	Sainte Marie, $\frac{1}{2}$ m. S. of.	Mose Correll.	.....
305	Water	Kane	Aurora, corner Lake and Spruce streets.	G. M. Crego	.....
306	...do.	...do.	Aurora, 2 m. from	J. G. Eck	.....
307	...do.	...do.	Aurora, 3 m. E. of	Geo. Jungles	.....
333	...do.	Kendall	Lisbon	John Moore	.....
309	...do.	Lake	Gurnee, $2\frac{1}{2}$ m. NW. of	H. C. Lincoln	W. M. Bolles
310	...do.	...do.	Lake Bluff, 3 m. NW. of sec. 18, T. 44, R. 12.	Chicago and Northwestern Rwy.	Gray Bros.
311	...do.	...do.	Rondout	Chicago, Milwaukee and St. Paul Rwy.	.....
312	...do.	...do.	Wadsworth, 3 m. NW. of, sec. 20, T. 46, R. 11.	John Irving	W. M. Bolles
313	...do.	...do.	Wadsworth, $1\frac{1}{2}$ m. N. of, sec. 22, T. 46, R. 11.	James McCann	...do.
314	...do.	...do.	Wadsworth, sec. 27, T. 46, R. 11.	Estate of Nicholas Lux.	...do.
315	...do.	...do.	Wadsworth, 4 m. NW. of, sec. 19, T. 46, R. 11.	Rose G. Reiley	...do.
^a 316	...do.	Lasalle	Peru	City of Peru	L. Wilson Well Co.
317	...do.	Lee	Ashton	Chicago and Northwestern Rwy.	J. P. Miller Art. Well Co.
318	...do.	Macon	Argenta, $3\frac{1}{4}$ m. NW. of	John Bricker	.....
319	...do.	...do.	Argenta	C. N. Denison	.....
320	...do.	...do.	Argenta, $2\frac{1}{2}$ m. SE. of	Frank Dunbar	.....
321	Water	...do.	Argenta, $3\frac{1}{4}$ m. W. of	Nathan Parr	.....
322	...do.	...do.	Argenta, 6 m. NE. of	School	.....
323	...do.	...do.	Boody, $\frac{1}{4}$ m. N. of, sec. 11, T. 15, R. 1.	District school	.....
324	...do.	...do.	Decatur, $1\frac{1}{4}$ m. W. of	Dreamland Park Co.	.....
325	...do.	...do.	Macon, $3\frac{1}{2}$ m. W. of	F. Wallenbrook	.....
326	...do.	Madison	Highland	Helvetia Milk Co.	.....
327	...do.	Marshall	"Stacy Diggings," sec. 21, T. 29, R. 1 E.	Wm. Stacy	.....
329	Brine	Perry	St. Johns	W. P. Halladay	.....
^a 330	Gas	Pike	Baylis, sec. 1	A. A. Troy	A. J. Clark
331	Water	...do.	Baylis, 4 m. S. of	J. C. Mink	.....
332	Gas	...do.	Baylis, 6 m. S. of	Wm. Irick	.....
333	Water	...do.	Elden Township	A. A. Troy	.....
334	...do.	...do.	Griggsville, $3\frac{1}{2}$ m. E. of	John Sleight	.....

^a See detailed record at end of table.

reported in 1905—Continued

ILLINOIS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks	No.
						Flow.	Pump.			
A. J. Coleman.....	D.	<i>Ft.</i> 616	<i>In.</i> 2	<i>Ft.</i> 403	<i>Ft.</i> — 20			1903	Water salty. (L.)...	304
J. G. Eek.....	D.	376	3	376	— 6			1897	Soft water. (L.).....	305
.....do.....	O.	112	4-3		+ 12	80		1900	Water at 78 feet	306
.....do.....	D.	294	2	260				1891	(L.).....	307
E. C. Thompson...	D.	186	4	168	— 14			1892	Soft water; water at 41 feet.	308
W. M. Bolles.....	D.	198	4½		— 31		25	1905	(L. S.)	309
.....do.....	O.		12-10½						Unfinished. (L. S.)..	310
.....do.....	O.	900	10-5	870					(L.).....	311
W. M. Bolles.....	C.	216	4½	216			18	1905	Soft. (L. S.).....	312
.....do.....	C.	218	4½	218	— 35		15	1905	Soft sulphur water. (L. S.)	313
.....do.....	D.	195	4½	195			15	1905	Soft. (L. S.).....	314
.....do.....	C.	237	4½-3½	237	— 40		15	1905	No water to 237 feet. (L. S.)	315
J. D. Kemp.....	D.	1,225	8	1,000	+ 85	200	600	1905	(L. S.).....	316
L. Nichols, Wm. Trentlage.	D.	248	12-10½	150	— 19		375	1905	Water-yielding crevice at 248 feet. (L. S.)	317
Wm. Musselman...	D.	255	4	200			8	1893	(L.).....	318
.....do.....	D.	135	4	135	— 35		8	1890	Water contains iron..	319
W. H. Musselman..	D.	132	3	124	— 65		8		Water at 90 feet; main supply contains iron.	320
Wm. Musselman...	D.	177	4	170	— 9		10	1895	Soft water; water at 100 and 150 feet. (L.)	321
W. H. Musselman..	D.	165	3	75	— 20		6	1905	Hard water.....	322
H. L. Swarthout...	D.	153	6		— 50			1896	"Medium hard" water.	323
W. H. Long.....	D.	110	6	80	— 50		100	1905	Water, iron-bearing; supplies amusement park. (L.)	324.
H. L. Swarthout...	D.	152	2	152				1900	Hard water.....	325
Fred Stocker.....	D.	475	6	300	— 60		1,800	1904	Water salty.....	326
M. T. Peterson.....	M.	211						1905	(S.).....	327
H. R. Haulenburg.	D.	3,800	10-4	1,960	—150		120	1903	Brine at 1,960-2,458 feet; wells near by 3,000 and 2,300 feet deep; found little brine.	329
A. J. Clark.....	C.	312	7½-5½					1905	Initial pressure, 8 pounds. (L.)	330
.....do.....	O.	180	7	64	— 24				Hard water. (L.)....	331
A. J. Clark.....	D.	203	5½					1905	Gas sand at 173 feet; initial pressure, 7 pounds. (L.)	332
.....do.....	D.	316						1905	(S.).....	333
John B. Dunant...	D.	250	8½-5½	240	— 40		12	1905	Soft water. (L.).....	334

Summary of well drilling

ILLINOIS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
335		Randolph	Red Bud, $\frac{1}{2}$ m. N. of	Red Bud City	
336	Water	do	Red Bud, sec. 10, T. 4, R. 9.		
337	do	Richland	Sec. 27, T. —, R. 10.	Farmers Milling Co.	
338	do	do	Dundas, 1 m. SW. of, sec. 34, T. —, R. 10.	A. B. McDonald	
339	do	Rock Island	Rock Island, $1\frac{1}{2}$ m. SE. of.	Rock Island Brewing Co.	L. Wilson Well Co.
340	do	do	Summit	Town of Summit	Needham Construction Co.
341	Oil	Saline	Texas City, 2 m. S. of.	Overton Oil and Gas Co.	
342	Water	Schuyler	Brooklyn, $1\frac{1}{2}$ m. S. of.	Henry Walker	
343	do	do	Rushville, 7 m. NW. of, sec. 5, T. 21, R. 3.	Bank of Rushville	Geo. Hartman
344	do	Vermilion	Ridge farm, $\frac{1}{2}$ m. E. of.	D. B. Sanders	
345	do	Wabash	Keensburg, $\frac{1}{2}$ m. E. of.	B. King	
345a	do	White	Late, 1 m. N. of	George Spencer	

INDIANA.

346	Water	Bartholomew	Taylorsville, 2 m. SW. of.	Glant Perry	Harry Anderson
347	do	Brown	Nashville, $\frac{1}{2}$ m. S. of	Perry Hanna	do
348	Oil	Delaware	Delaware Township, Wm. Barber farm, well No. 1.	Smith-Neely Oil Co.	St. Marys Drilling Co.
349	do	do	Delaware Township, sec. 8, Jno. Barrett farm, well No. 1.	Ohio Valley Oil and Gas Co.	do
350	do	do	Delaware Township, sec. 4, W. H. Black farm, well No. 8.	do	do
351	do	do	Delaware Township, sec. 7, Ed Brammer farm, well No. 1.	do	do
352	do	do	Delaware Township, D. E. Brammer farm, well No. 3.	do	E. W. Leitz & Bros.
353	do	do	Delaware Township, sec. 11, Jno. A. Brown farm, well No. 2.	do	St. Marys Drilling Co.
354	do	do	Delaware Township, sec. 5, Mary E. Bryan farm, well No. 6.	do	do
355	do	do	Delaware Township, sec. 17, L. H. Holloway farm, well No. 2.	do	do
356	do	do	Delaware Township, sec. 10, C. M. McNelly farm, well No. 6.	do	do
357	do	do	Delaware Township, sec. 5, Geo. A. Stafford farm, well No. 5.	do	do

a See detailed record at end of table.

SUMMARY OF DRILLING.

57

reported in 1905—Continued.

ILLINOIS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Reed O'Leary.....	M.	259	3	196	+ 8	.....	.....	.....	Water at 70 feet; main supply soft. (L.)	335
John T. McCaffrey.	D.	300	.....	.....	-20	.....	18	.....	Soft water.....	336
J. L. Wright.....	D.	265	6-5	225	-50	.....	Large	1896	.....	337
.....do.....	D.	234	6-5	100	-20	.....	.....	1890	.....	338
H. W. Hambrecht.	C.	2,157	12-4	.....	-58	.....	500	1905	Supply from below 1,730 feet. (L. S.)	339
.....	M.	300	.....	.....	.....	.....	.....	1905	(S.).....	340
T. W. Overton....	D.	1,300	8	.....	.....	.....	.....	.....	Salt water at 500-600 feet.	341
John B. Dunant....	D.	200	8-5 $\frac{3}{8}$	190	-30	.....	5	1888	Sulphur water.....	342
.....do.....	D.	372	7 $\frac{3}{8}$ -5 $\frac{1}{2}$	47	-47	.....	.....	1905	(L. S.).....	343
Alfred Hester.....	D.	102 $\frac{1}{2}$	2 $\frac{1}{2}$	102 $\frac{1}{2}$	-22	.....	.....	1900.	.....	344
Saml. Goodwin....	D.	200	4	90	-15	.....	.....	1904	Hard water.....	345
John F. Orr.....	D.	450	6	.....	-20	.....	.....	1903	Salty water.....	345a

INDIANA.

Harry Anderson...	D.	242	5 $\frac{1}{8}$	240	-50	.....	.....	1898	(L.).....	346
.....do.....	D.	512	5 $\frac{1}{8}$	500	Flows.	14	.....	1899	(L.).....	347
.....	M.	1,224	8-5 $\frac{1}{8}$	.....	.....	.....	.....	1904	Top sand at 925 feet; first oil at 1,189 feet; 600 feet of water.	348
.....	C.	1,281	8-4 $\frac{1}{4}$	.....	.....	.....	.....	1904	Top sand at 967 feet; salt water at 980 feet; no oil obtained.	349
.....	C.	1,277	8-6 $\frac{1}{4}$	.....	.....	.....	.....	1904	Top sand at 945 feet; first gas at 968 feet; salt water at 1,030 feet; dry hole.	350
.....	C.	1,231	8-5	.....	.....	.....	.....	1904	Top sand at 914 feet; first oil at 1,214 feet; salt water at 940 feet.	351
.....	M.	962	8-6 $\frac{1}{4}$	.....	.....	.....	b 15	1904	Top sand at 912 feet; first oil at 924 feet.	352
.....	C.	1,206	8-5 $\frac{1}{8}$	.....	.....	.....	b 10	1904	Top sand at 914 feet; first oil at 1,186 feet.	353
.....	C.	1,244	8-6 $\frac{1}{4}$	.....	.....	.....	b 100	1904	Top sand at 931 feet; first oil at 1,221 feet. salt water at 951 feet.	354
.....	C.	1,207	10-6 $\frac{1}{4}$	.....	.....	.....	b 200	1904	Top sand at 920 feet; first oil at 940 feet; second oil at 1,196 feet.	355
.....	C.	1,175	10-6 $\frac{1}{4}$	.....	.....	.....	b 250	1904	Top sand at 915 feet; first oil at 1,170 feet.	356
.....	C.	1,220	8-6 $\frac{1}{4}$	.....	.....	.....	b 95	1904	Top sand at 927 feet; first oil at 947 feet; second oil at 1,200 feet.	357

b Barrels a day.

Summary of well drilling

INDIANA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
358	Oil.....	Delaware.....	Delaware Township, sec. 17, John Stafford farm, well No. 2.	Ohio Valley Oil and Gas Co.	St. Marys Drilling Co.
359	do.....	do.....	Delaware Township, sec. 6, W. H. Stafford farm, well No. 2.	do.....	do.....
360	do.....	do.....	Delaware Township, sec. 4, Marietta Richey farm, well No. 1.	do.....	do.....
361	do.....	do.....	Hamilton Township, sec. 13, Wm. Campbell farm, well No. 1.	do.....	do.....
362	do.....	do.....	Liberty Township, Lew Sparks farm, well No. 2.	Union Oil Co.	do.....
363	do.....	do.....	Niles Township, sec. 28, W. D. Barley farm, well No. 4.	Ohio and Indiana Cons. N. and I. Gas Co.	do.....
364	do.....	do.....	Niles Township, sec. 28, Geo. Lowe farm, well No. 2.	Smith, Neely & Sargent.	Neely & Borton..
365	do.....	do.....	Niles Township, sec. 32, Jacob Peterson farm, well No. 2.	Brewster Oil Co....	St. Marys Drilling Co.
366	do.....	do.....	Niles Township, sec. 28, J. E. Racer farm, well No. 5.	Dupaunee Oil Co....	do.....
367	do.....	do.....	Niles Township, sec. 24, Wm. Rutledge farm, well No. 1.	Ohio and Indiana Cons. N. and I. Gas Co.	do.....
368	Gas.....	do.....	Niles Township, sec. 14, M. Shirk farm, well No. 208.	do.....	do.....
369	Oil.....	do.....	Niles Township, sec. 33, Geo. W. Younts farm, well No. 3.	Ohio Valley Oil and Gas Co.	do.....
a 370	do.....	do.....	Selma, 1½ m. SW. of, sec. 22, T. 20, R. 11 E., H. K. Lewis farm, well No. 25.	Republic Iron and Steel Co.	Shirkcliff & Anderson.
371		Elkhart.....	Goshen, 5 m. SW. of, Hoover farm.		
372	Water..	Gibson.....	Owensville, 3 m. NE. of, sec. 31, T. 2, R. 11.	J. A. Smith.....	
372a	do.....	do.....	Owensville, 4 m. N. of.	Warwick Armstrong.	
373	do.....	Jackson.....	Brownstown, 1 m. W. of, sec. 10, T. 5, R. 5.	Brownstown Strawboard and Paper Co.	
374	Oil.....	Jay.....	Bear Creek Township, W. R. Black farm, well No. 4.		

a See detailed record at end of table.

reported in 1905—Continued.

INDIANA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	C.	1,223	10-6 $\frac{1}{2}$	.....	.....	.....	b 70	1904	Top sand at 909 feet; first gas at 931 feet; first oil at 1,187 feet.	358
.....	C.	1,210	10-6 $\frac{1}{2}$	.....	.....	.....	b 45	1904	Top sand at 905 feet; first oil at 1,198 feet; salt water at 1,125 feet.	359
.....	C.	1,246	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 930 feet; salt water at 950 feet; a little oil after shot.	360
.....	C.	1,255	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 923 feet; dry hole.	361
.....	C.	1,241	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 961 feet; little gas at 981 feet; salt water at 1,241 feet; poor showing of oil.	362
.....	C.	1,281	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 936 feet; first gas at 956 feet; first oil at 1,250 feet; no water; fair showing of oil after shot.	363
.....	M.	1,295	8-5 $\frac{3}{8}$	.....	.....	.....	b 100	1904	Top sand at 954 feet; first gas at 974 feet; first oil at 1,265 feet.	364
.....	C.	1,285	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 946 feet; salt water at 955 feet; 800 feet salt water in well; not shot.	365
.....	C.	1,272	8-6 $\frac{1}{2}$	.....	.....	.....	b 30	1904	Top sand at 945 feet; first oil at 1,239 feet.	366
.....	C.	1,451	8-5 $\frac{3}{8}$	.....	.....	.....	.....	1904	Top sand at 933 feet; first oil at 958 feet; salt water at 1,451 feet; dry hole.	367
.....	C.	1,004	10-5 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 937 feet; first gas at 972 feet; yield first 24 hours, 900,000 cubic feet.	368
.....	C.	1,267	8-5	.....	.....	.....	.....	1904	Top sand at 950 feet; salt water at 970 feet; 500 feet of salt water.	369
.....	C.	1,219	8-6	.....	.....	.....	.....	1905	(L. S.).....	a 370
E. Hartzler.....	.....	140	.....	.....	+16	.....	.....	.....	(L.).....	371
Wilson & Bro.....	O.	124	6	122	+ 1	c $\frac{1}{4}$	.....	1903	Iron-bearing water...	372
.....do.....	O.	154	6	.....	-16	.....	.....	1905	Soft water. (L.).....	372a
J. L. Burns.....	O.	584	8-5 $\frac{3}{8}$	400	- 6	.....	.....	1905	.....	373
.....	.....	1,092	.....	.....	.....	.....	.....	.....	.....	374

b Barrels a day.

c Quart.

Summary of well drilling

INDIANA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
375	Gas.....	Jay.....	Knox Township, sec. 13, Corwin farm, well No. 1.	Logansport and Wabash Valley Gas Co.	St. Marys Drilling Co.
376	Oil.....	do.....	Richland Township, sec. 24, O. J. Current farm, well No. 2.	Smith-Neely & Current.	do.....
377	do.....	do.....	Richland Township, sec. 28, Hickman farm, well No. 1.	Brewster Oil Co.	do.....
378	Gas.....	do.....	Knox Township, sec. 14, Jarnagen farm, well No. 2.	Logansport and Wabash Valley Gas Co.	do.....
379	Oil.....	do.....	Knox Township, sec. 36, A. Landers farm, well No. 1.	Ohio and Indiana Cons. N. and I. Gas Co.	do.....
380	.....	Lake.....	Indiana Harbor.....	Standard Forging Co.	.....
381	Water..	Lawrence.....	Bedford, 3 m. NW. of, sec. 5, T. 5, R. 1.	M. F. Dunn.....	.....
382	do.....	do.....	Bedford, 1 m. SE. of, sec. 24, T. 5, R. 1.	Midland Portland Cement Co.	.....
383	do.....	do.....	Mitchell, near B. & O. R. R. station.	.....	.....
384	do.....	do.....	Mitchell, 4 m. SE. of, sec. 9, T. 3, R. 1.	James Bartlett.....	.....
385	do.....	Marion.....	Indianapolis, Station B, $\frac{1}{4}$ m. SE. of.	City of Indianapolis	Frank Butts.....
386	Gas.....	Martin.....	Loogootee $3\frac{1}{2}$ m. SE. of, sec. 2.	Loogootee Light and Fuel Co.	Loogootee, Light and Fuel Co.
387	do.....	do.....	Loogootee, 3 m. SW. of, Barr Township, sec. 2.	Phoenix Glass Co.	do.....
388	Water..	Monroe.....	Harrodsburg.....	Town of Harrodsburg.	.....
389	do.....	Parke.....	Bellmore, 2 m. E. of...	James Brocknay...	C. J. Cassidy.....
390	do.....	do.....	Bellmore, 2 m. SE. of...	Bion Collings.....	.....
391	do.....	do.....	Montezuma, 2 m. E. of...	Marion brick works.	C. J. Cassidy.....
392	do.....	Posey.....	New Harmony, 6 m. SE. of.	Ezra Stephen.....	.....
393	.....	do.....	St. Wendells, sec. 7, T. 5, R. 11.	John Coudret.....	Wm. H. Miller....
394	Water..	do.....	St. Wendells, sec. 12, T. 5, R. 12.	James M. Haines.....	do.....
395	.....	do.....	Wadesville, 3 m. S. of, sec. 29, T. 5, R. 12.	Henry Donner.....	do.....
396	Water..	do.....	Wadesville, $1\frac{1}{2}$ m. NE. of.	Geo. Garriss.....	Martin Brown....

a See detailed record at end of table.

reported in 1905—Continued.

INDIANA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	C.	944	8-5½					1904	Top sand at 920 feet; first gas at 928 feet; salt water at 940 feet; filled up 200 feet while drilling; plugged.	375
	C.	1,421	8-6½					1904	Top sand at 963 feet; first gas at 983 feet; salt water at 1,415 feet; plugged and casing pulled.	376
	C.	1,232	8-6½					1904	Top sand at 925 feet; little gas at 950 feet; first oil at 1,225 feet; salt water at 1,232 feet; after shot filled 450 feet water.	377
	C.	995	8-5½					1904	Top sand at 950 feet; first gas at 975 feet; yield first 24 hours, 344,000 cubic feet.	378
	C.	1,449	8-5½					1904	Top sand at 939 feet; first oil showing at 969 feet; dry hole.	379
H. K. Wilson	D.	424						1905	(S.)	380
Lem Harbaugh	D.	104	6	104	+17	1		1898	Sulphur water; hard water at 20, 30, 60 feet; cased off. (L.)	381
do	D.	150	6	60	-40		10	1902	Hard and salty water. (L.)	382
do		300	8	150			400		Hard water at 90 feet; sulphur water at 150 feet; no water below. (L.)	383
James Bartlett	O.	100	3	75	-75			1903		384
Chas. Kraus	M.	120	8		-50		400	1905	Soft water.	385
C. O. Potter	D.	542	8-5½					1905	Show of oil at 187-210, 355-375, and 415-440 feet; gas sand at 518 feet; initial pressure, 55 pounds; yield, 75,000 cubic feet.	386
C. O. Potter and S. E. Patterson.	D.	532	8-5½					1905	50,000 feet; water at 70-85 feet. (L.)	387
Lem Harbaugh	D.	109	6	102	-30			1887	Town well; hard sulphur water. (L.)	388
C. J. Cassidy	D.	116	5½	114	-67		5	1905	(L.)	389
do	D.	250	6	180			4	1901	Abandoned. (L.)	390
do	C.	145	5½	120	-25		8	1902	Clear soft water. (L.)	391
J. W. Williams	D.	158						1905	(S.)	392
Wm. M. Miller	D.	185	36-5½	177			1½		Water at 39-41, and 177-185 feet. (L.)	393
do	D.	188	36-5½				1½	1905	(L. S.)	394
do	D.	167	36-5½	155			4		(L. S.)	395
M. Brown	C.	180	6	178	-60		15	1902	Hard water.	396

*Summary of well drilling***INDIANA—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
397	Oil.....	Randolph.....	Parker, 1½ m. W. of, well No. 2, Anderson Jones farm, Liberty Township.	Bankers Oil Co.....	Iona Drilling Co.
398	do.....	do.....	Monroe Township, Leeka Lot Parker farm, well No. 1.	Smith-Neely Oil Co.	St. Marys Drilling Co.
399	Gas.....	do.....	Farmland, 4 m. NE. of, well No. 1 on Winfield Hiatt farm, Monroe Township.	Indiana Pipe Co.....	Iona Drilling Co..
400	Oil.....	do.....	Parker, 4½ m. NE of, sec. 34, T. 20, R. 12, well No. 4 on J. F. Wood farm, Muncie district.	Ohio and Indiana Oil Co.	do.....
a 401	do.....	do.....	Parker, 3 m. NE. of, Van Pelt farm, well No. 4.	Van Pelt Oil Co.....	do.....
a 402	Water..	Vanderburg.....	Howell, 2 m. N. of, West Height Park.	Evansville Brewing Association.	Wm. H. Miller....
403	Oil.....	Wayne.....	Dalton Township, Ben Beeson heirs' farm, well No. 1.	G. C. Scott.....	St. Marys Drilling Co.

INDIAN TERRITORY.

404	Oil.....	Cherokee Nation..	Sec. 21, T. 28, R. 13.....	Lumberman's Oil and Gas Co.	.....
405	do.....	do.....	Sec. 4, T. 27, R. 13.....	Sand Creek Oil and Gas Co.	.....
406	Oil.....	do.....	Sec. 12, T. 12, R. 25.....	Uncle Sam Oil Co.....	.....
a 407	do.....	do.....	Alluwe, 1½ m. N. of, sec. 18, T. 25, R. 17.	Carey Oil and Gas Co.	McAdam & Co....
a 408	do.....	do.....	Bartlesville, 1½ m. NW. of, sec. 1, T. 26, R. 12, well No. 2 on Norton lease.	Curl & Scott.....	Standard Drilling Co.
409	do.....	do.....	Collinsville.....	.....	.....
410	do.....	do.....	Fort Gibson, ¾ m. W. of, sec. 2, T. 15, R. 19.	Fort Gibson Oil and Gas Co.	W. A. Aggers.....
411	do.....	do.....	Bartlesville, Morton lease, sec. 1, T. 26, R. 12.	Curl & Scott.....	.....
412	do.....	do.....	Owasso, sec. 30, T. 31, R. 14.	Geo. C. Priestley...	.....
413	Water..	do.....	Tahlequah.....	C. A. Reis.....	.....
414	do.....	do.....	do.....	do.....	.....
415	Oil.....	do.....	Turley, sec. 13, T. 21, R. 12.	Creek and Indiana Development Co.	Chas. Buehler.....

a See detailed record at end of table.

reported in 1905—Continued.

INDIANA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Wolf & Wolf.....	C.	1,033	8-6 $\frac{1}{2}$	1 010	.....	.....	.....	1905	Trenton lime at 994 feet; first gas at 1,004 feet.	397
.....	C.	1,287	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 982 feet; first gas (little) at 1,002 feet; first oil (little) at 1,002 feet; salt water at 1,012 feet; filled hole; plugged.	398
Wolf & Wolf.....	C.	1,021	8-5 $\frac{1}{2}$	.....	.....	.....	.....	1905	Trenton lime at 986 feet; first gas at 1,002 feet; yield, 100,000 cubic feet.	399
Wade and Fisher..	C.	1,232	8-5 $\frac{1}{2}$	1,225	.....	b 400	.....	1905	Water at 21-81 and 280-310 feet; oil and gas at 950-965 feet. (L.)	400
William Kattor and Levi Kattor.	O.	1,260	8-5 $\frac{1}{2}$	1,245	.....	.....	b 60	1905	Water at 140-165 and 380-400 feet; gas at 960-965 feet; oil sand at 1,240-1,255 feet. (L. S.)	401
Wm. M. Miller....	D.	310	5 $\frac{1}{2}$	288	.....	.....	1 $\frac{1}{2}$	1905	(L. S.).....	402
.....	C.	1,444	8-5	.....	.....	.....	.....	1904	Top sand at 942 feet; dry hole.	403

INDIAN TERRITORY.

W. H. Hamilton...	M.	1,305	.....	.....	.....	.....	.....	1905	(S.).....	404
H. W. McMahan...	O.	1,355	.....	.....	.....	.....	.....	1905	(S.).....	405
W. T. Zimmer.....	D.	1,344	.....	.....	.....	.....	.....	1905	(S.).....	406
McAdam & Co.....	M.	519 $\frac{1}{2}$	8 $\frac{1}{2}$ -6 $\frac{1}{2}$	.....	.....	b 75	.....	1905	(L. S.).....	407
P. Gates.....	M.	1,319 $\frac{1}{2}$	10-6 $\frac{1}{2}$	.....	.....	b 40	.....	1905	Oil at 1,280 feet. (S.)	408
Jas. Brown.....	M.	1,300	.....	.....	.....	.....	.....	1905	(S.).....	409
Gruyer and Wyant	D.	1,260	13-6 $\frac{1}{2}$	330	.....	.....	4	1905	Fresh water at 60 feet; filled to top with warm mineral water. (L. S.)	410
Standard Drilling Co.	D.	540	.....	.....	.....	.....	.....	1905	(S.).....	411
Urban Drilling Co..	M.	904	.....	.....	.....	.....	.....	1905	(S.).....	412
J. M. Short.....	M.	154	.....	.....	.....	.....	.....	1905	(S.).....	413
do.....	M.	204	.....	.....	.....	.....	.....	1905	(S.).....	414
T. B. Mack.....	D.	1,173	13-10	.....	.....	b 20	.....	1905	Water at 30-40, 300-450, and 700-750 feet; top of oil sand at 1,130 feet. (L. S.)	415

b Barrels a day.

Summary of well drilling

INDIAN TERRITORY—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a 416	Oil.....	Cherokee Nation.	Turley, 3½ m. N. of, sec. 13, T. 21, R. 12.	Creek and Indian Development Co.	Chas. Buchter.....
417	do.....	do.....	Turley, 3½ m. N. of, sec. 13, T. 21, R. 12, well No. 1 on Nancy Chisholm farm, Hominy Creek pool.	do.....	do.....
418	do.....	Chickasaw Nation.	Ardmore.....	Ardmore Cotton Oil Co.	J. J. Myers.....
419	Water.....	do.....	Chickasha, 10 m. S. of.....		
420	do.....	do.....	Chickasha, 3 m. S. of.....	Frank Baker.....	
421	do.....	do.....	Chickasha, 10 m. SE. of, sec. 18, T. 6, R. 6.	Judge Guthes.....	
a 422	Oil.....	do.....	Davis, ¼ m. S. of.....	California Oil and Asphalt Co.	Jolly & Hahn.....
423	Water.....	do.....	Millcreek, 1 m. W. of.....	Cunningham.....	L. L. Smith.....
424	do.....	do.....	Millcreek.....		do.....
425	do.....	do.....	Sulphur, ¼ m. W. of, sec. 4, T. 1, R. 3.	D. H. Colbert.....	
426	do.....	do.....	Sulphur.....	J. D. Kirby.....	Lewis L. Smith.....
427	do.....	Choctaw Nation.	Brooken, 2½ m. NE. of.....	J. Bickle.....	
428	Oil.....	do.....	Crowder.....	E. J. Ralston.....	
429	do.....	do.....	Krebs, 1½ m. W. of.....	Great Western Coal Co.	
430	Water.....	do.....	Krebs.....	James McGinnis.....	
431	do.....	Creek Nation.....	Checotah.....	Flanigan.....	
432	do.....	do.....	Checotah, ¼ m. NW. of.....	W. J. Henson.....	
433	do.....	do.....	Checotah, 9 m. W. of.....	Jack Warren.....	
434	do.....	do.....	Eufaula, 2 m. N. of, sec. 34, T. 18, R. 16 E.	Cleveland Whitlow.....	
a 435	Oil.....	do.....	Henryetta, ½ m. S. of.....	Smith & Swan.....	Smith & Swan.....
436	Water.....	do.....	Irene, 3 m. W. of.....	John Ramy.....	
437	do.....	do.....	Okemah.....		
438	do.....	do.....	Okemah, 4 m. NE. of.....	J. P. Williams.....	
439	Oil.....	do.....	Red Fork.....	Hecla Oil Co.....	
440	do.....	do.....	Red Fork, J. S. Clinton, well No. 1.	Jesse L. Leonard.....	
441	Gas.....	do.....	Tulsa district, B. Grayson farm, sec. 5, T. 19, R. 12.	Osage and Oklahoma Co.	
442	Oil.....	do.....	Tulsa district, Osage South farm, sec. 3, T. 21, R. 12.	do.....	
443	do.....	do.....	Wagoner.....		
444	do.....	do.....	Wagoner, 1 m. N. of.....	W. D. Berry.....	

a See detailed record at end of table.

reported in 1905—Continued.

INDIAN TERRITORY—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
T. B. Mack.....	C.	1,170	8-6½			b 25		1905	Water from 350-560 and 700-740 feet. (L.S.)	416
.....do.....		1,197	10				b 9	1905	Water at 250-340 and 600-640 feet; oil at 1,135 feet; well yields 9 barrels oil and 36 barrels salt water; initial yield, 60 barrels oil.	417
J. J. Myers.....	C.	910	6-4½					1896	No oil obtained. (L.)	418
J. J. Berry.....	D.	135	6	75	-70			1905		419
.....do.....	D.	150	7-6	140	-60		7	1903		420
.....do.....	D.	135	7	75	-60			1905		421
Jolly & Hahn.....	C.	906	8-6½					1905	Water at 40-45 feet; salt water at 400-410 feet. (L.)	422
L. L. Smith.....	D.	38	6	38	-18					423
.....do.....	D.	46	6	46	-16				(L.)	424
J. H. Perkins.....		178	10	120	Flows.	1		1905	Sulphur water	425
Lewis L. Smith....	D.	100	6					1901	Dry hole	426
J. P. Williams.....	D.	182	6	180	- 6			1903	Hard water	427
E. J. Ralston.....	O.	774						1905	(S.)	428
Alex. Anderson....	D.	450	6	60					Rope hole at coal mine. (L.)	429
.....			6	40				1895	Water hard	430
A. J. Moore.....	D.	150	6	96		-22	1.6	1905	(L.)	431
A. B. Moore.....	M.	114	6	100	-14			1903	Soft water	432
Wm. Filldon.....	D.	100	6	96	-36			1904		433
Malon Swartwood..	D.	139	10-6	80				1905	Salty water. (L.)	434
Chas. W. Swan....	O.	2,309	8½-6½					1905	Heavy paraffine oil and gas at 1,016-1,027 feet; coal at 2,020-2,024 feet. (L.)	435
J. P. Williams.....	D.	149	7	147	-80			1905	Soft water	436
Chas. C. Bradburn..	D.	158	6						No water	437
J. P. Williams.....	D.	130	6½-5	130	-80			1903	Sulphur water; small flow; not used.	438
L. W. Sonntag and A. W. Leonard.	D.	732						1905	(S.)	439
L. Sonntag.....	O.	1,120						1905	(S.)	440
.....	O.	1,223						1905	Water at 150, 350, and 890 feet; gas at 817, 832, 1,030, and 1,219 feet. (L.)	441
.....	O.	1,254						1905	Water at 25-30, 350-390, and 490-525 feet; gas at 835-860 feet; oil at 1,244 feet. (L.)	442
E. W. Carothers..	D.	1,005						1905	Water at 240 feet. (L.S.)	443
Fred Garrison.....	O.	800	8-6	760	Flows.	1½		1902	Salt water; no oil	444

b Barrels a day.

Summary of well drilling

INDIAN TERRITORY—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
446	Oil.....	Creek Nation....	Wagoner, $\frac{1}{2}$ m. W. of...	J. C. Castner	
447	Water .....	.....do.....	Wagoner, $\frac{1}{2}$ m. E. of...	E. H. Eler	
448	Oil.....	.....do.....	Wagoner, $\frac{1}{2}$ m. NE. of..	Home Gas and Oil Co.	F. R. Garrison....
449	Water .....	.....do.....	Wetumka, near post-office.	Chas. C. Bradburn..	
450	.....do.....	.....do.....	.....do.....	E. D. Rosenbaum ..	
451	.....	Osage Nation....	Osage north farm, sec. 1, T. 27, R. 11.	Osage and Oklahoma Co.	
452	Oil.....	.....do.....	Osage north farm, sec. 30, T. 27, R. 11.	.....do.....	
453	.....do.....	.....do.....	Osage south farm, sec. 4, T. 20, R. 12.	.....do.....	
454	.....do.....	.....do.....	Sec. 17, T. 27, R. 11.	.....do.....	B. Stafford.....
455	Water	Ottawa Nation..	Miami.....	Miami Town Co.	
456	Oil.....	Osage Nation....	Lot No. 64, well No. 11.	Roth, Argue & Maire.	

IOWA.

^a 457	Water	Blackhawk.....	Waterloo.....	Waterloo Water Co	
458	.....do.....	Calhoun.....	Manson, near post-office	Town of Manson.....	J. F. McCarthy...
459	.....do.....	Davis.....	Coatesville, $3\frac{1}{2}$ m. NE. of	Coort Frakes.....	
460	.....do.....	Des Moines.....	Mediapolis.....	D. Hutchcroft	
^a 461	.....do.....	Floyd.....	Charles City.....	Charles City.....	
462	.....do.....	Hardin.....	Iowa Falls, $\frac{1}{2}$ m. NE. of..	City of Iowa Falls..	
463	.....do.....	Jackson.....	Green Island.....	Chicago, Milwaukee and St. Paul R. R.	
464	.....do.....	Lee.....	Keokuk.....	Young Men's Christian Association.	D. W. Haggerty..
^a 465	.....do.....	Louisa.....	Letts.....	W. W. Wagner.....	
^a 466	.....do.....	Mahaska.....	Oskaloosa, 6 m. SE. of.	Miss Tullis.....	R. L. Purcell....
466	.....do.....	.....do.....	Oskaloosa, 5 m. S. of...	Owen Mobley.....	.....do.....
467	.....do.....	Marion.....	Swan, 4 m. SE. of, sec. 24, T. 77, R. 21.	Isaac Hodgson.....	
468	.....do.....	O'Brien.....	Hartley.....	City of Hartley.....	
469	.....do.....	Sac.....	Auburn, sec 24, T. 86, R. 35.	Chicago and Northwestern R. R.	A. F. Jenkins.....
^a 470	.....do.....	Scott.....	Davenport.....	Davenport Malt and Grain Co.	L. Wilson Well Co.
^a 471	.....do.....	Wapello.....	Ottumwa well No. 5...	Jno. Morrell Packing Co.	J. P. Miller Artesian Well Co.
472	.....do.....	Webster.....	Dayton, sec. 14, T. 86, R. 28.	City of Dayton, Iowa.	J. H. Shaw.....

^a See detailed record at end of table.

reported in 1905—Continued.

INDIAN TERRITORY—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Malzer.....	M.	<i>Ft.</i> 1,030	<i>In.</i> 8-6	<i>Ft.</i> 800	<i>Ft.</i> Flows.	.....	.....	1902	Salt water; trace of oil.	446
.....	M.	106	6	100	.....	.....	.....	1901	Soft water.....	447
F. R. Garrison.....	C.	1,006	13-64	.....	.....	.....	.....	1905	Water at 140-150, 287-365, 445-490, 500-620, 750-770, and 835-845 feet; yields salt water. (L.).....	448
Reuben O. Grangeone.	M.	156	6	150	- 50	.....	.....	1902	Salty water. (L.)....	449
Sinclair & Bradburn.	D.	222	6	80	- 20	.....	.....	1904	Soft water at 20 feet; salty at 222 feet. (L.)	450
.....	O.	2,013	.....	.....	.....	.....	.....	1905	(L.).....	451
.....	O.	1,895	.....	.....	.....	.....	.....	1905	Salt water at 548-628 feet. (L.)	452
.....	O.	1,475	.....	1,460	.....	.....	.....	1905	(L.).....	453
.....	O.	1,938	.....	1,917	.....	.....	.....	1905	(L.).....	454
.....	.....	1,270	8	600	+ 60	210	.....	.....	Water at 600-1,240 feet (L.)	455
Shaffer Bros.....	D.	1,710	.....	1,681	.....	b 200	.....	1905	17 feet of oil. (S.)....	456

IOWA.

W.H. Gray & Bros.	O.	1,373	15-8	1,360	+ 20	200	700	1905	Water at 840 feet. (S.)	457
C. G. Anderson.....	M.	1,250	10-44	1,050	- 38	.....	200	1902	Soft; town supply....	458
Frank Hardin.....	D.	116	6	109	- 75	.....	.....	.....	Hard water.....	459
J. F. Tweedy.....	M.	600	.....	.....	.....	.....	.....	1905	(S.).....	460
.....	M.	1,590	.....	.....	.....	.....	.....	1905	(S.).....	461
J. F. McCarthy.....	M.	240	10	183	Flows.	30	235	1904	One of two wells; other 276 feet deep; iron and sulphur. (L.)	462
.....	O.	823	8-43	504	.....	.....	.....	1902	(L.).....	463
Wm. Dwyer.....	C.	769	6	769	+ 20	300	.....	1902	Hard water. (L.)....	464
J. H. Grayton.....	O.	1,135	.....	.....	.....	.....	.....	1905	(S.).....	465
R. L. Purcell.....	D.	225	6-4	215	.....	.....	3	1905	Water at 188 feet. (L.)	466
.....do.....	D.	188	6-33	188	- 135	.....	.....	1905	Soft (L.).....	466
.....	O.	236	4-3	200	- 4	.....	.....	1899	Salty water.....	467
Lane & Boyse.....	M.	200	8	200	- 50	.....	70	1904	(L.).....	468
A. F. Jenkins.....	M.	124	4	116	.....	.....	.....	1905	(L.).....	469
.....	C.	1,653	12-54	1,400	.....	150	.....	1905	(L.).....	470
L. Nichols and F. Bargman.	.....	2,205	.....	1,100	.....	.....	1,400	1905	Water at 1,100 and 1,485-1,896 feet; no water below. (L.)	471
J. D. Shaw and Joe Warner.	D.	689	10-8	570	- 100	.....	75	1905	3 feet of coal at 208 feet. (L.S.)	472

b Barrels a day.

Summary of well drilling

IOWA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
473	Water..	Woodbury.....	Sioux City, $\frac{1}{2}$ m. SW. of, sec. 29, T. 89, R. 47.	Sioux City Brewing Co.	J. H. Shaw.....
474	...do...	Wright.....	Clarion, near post-office.	Town of Clarion....	.....

KANSAS.

475	Water..	Allen.....	Humboldt, 3 m. SE. of, sec. 23, T. 26, R. 18.	Phoenix Oil and Gas Co.	.....
476	Oil.....	.....do.....	Humboldt, 3 m. SE. of, well No. 1, Wiggins farm, sec. 14, T. 26, R. 18.	.....do.....	Phoenix Oil and Gas Co.
^a 477	Gas.....	.....do.....	Laharpe, $\frac{1}{2}$ m. N. of, sec. 27, T. 24, R. 19, well No. 1, on F. E. Farmer's addition.	Lanyon Zinc Co....	F. J. Horton.....
478	.....	Anderson.....	Walker Township, sec. 35, T. 19, R. 20, well No. 1 on H. Egeidy farm.	I. N. Knapp.....	.....
479	.....	.....do.....	Walker Township, sec. 6, T. 20, R. 21, well No. 1, on D. E. Pea farm.	.....do.....	.....
480	.....	.....do.....	Walker Township, sec. 19, T. 19, R. 21, well No. 1, L. O. Rees farm.	.....do.....	.....
481	.....	.....do.....	Walker Township, sec. 19, T. 19, R. 21, well No. 1, J. K. Spencer farm.	.....do.....	.....
482	.....	.....do.....	Walker Township, sec. 5, T. 20, R. 21, well No. 1, Nancy Sutton farm.	.....do.....	.....
^a 483	Oil.....	Chase.....	Strong City, $1\frac{1}{2}$ m. W. of, sec. 17, T. 19, R. 8.	Strong City Oil and Gas Co.	National Drilling Co.
484	...do....	Chautauqua....	Hewins, $3\frac{1}{2}$ m. E. of, sec. 6, T. 35, R. 10.	Geiser, Evers & Sadler.	Jas. Taylor.....
485	Water..	Cherokee.....	Baxter Springs, 1 m. NW. of.	Frisco Rwy.....	A. J. Laird.....
486	.....	.....do.....	Columbus, $2\frac{1}{2}$ m. N. of well No. 1 on Larue farm.	Black Hills and Kansas Oil and Gas Co.	Loy & Wilson Drilling Co.
^a 487	.....	Coffey.....	Burlington, 4 m. S. and 1 m. W. of, well No. 1 on Clark farm.	Bartlett Co.....	...do.....
488	Gas.....	Cowley.....	Arkansas City, 2 m. N. of, well No. 1, on Canfield farm.	Nelson Oil Co.....	Iona Drilling Co..

^a See detailed record at end of table.

reported in 1905—Continued.

IOWA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. D. Shaw.....	C.	Ft. 215	In. 10-8	Ft. 104	Ft. - 20	.....	Gals. 500	1905	Water at 104-140 feet. (L. S.)	473
S. Swensen.....	M.	260	10	260	- 27	.....	250	1905	Water at 80 feet; hard; town supply.	474

KANSAS.

.....	M.	280	4½	280	.....	.....	.....	1904	Hard and salty water.	475
Phoenix Oil and Gas Co.	O.	857	4½	.....	.....	.....	.....	1905	.....	476
Ridgeway and E T. Stanley.	D	920	8-6½	.....	.....	.....	.....	1905	Water at 215-225 and 470-500 feet; yield, 3,000,000 cubic feet first 24 hours; pressure, 220 pounds. (S.)	477
.....	O.	1,025	8½-4½	.....	.....	.....	.....	1905	Water at 25 and 500 feet; salt water at 288 and 1,020 feet; dry hole. (L.)	478
.....	O.	832	8½-4½	.....	.....	.....	.....	1905	Dry hole. (L.).....	479
.....	O.	807	8½-4½	.....	.....	.....	.....	1904	Gas at 170 feet; water at 172 and 212 feet; salt water at 465 and 799 feet; dry hole. (L.)	480
.....	O.	1,190	10-6½	.....	.....	.....	.....	1905	Dry hole. (L.).....	481
.....	O.	985	8½-5	.....	.....	.....	.....	1904	Water at 85 feet; gas sand at 714 feet; dry hole. (L.)	482
H. W. Greene.....	O.	1,960	14-4½	.....	.....	.....	.....	1905	Gas at 339-349 feet; salt water at intervals from 350-1,600 feet; no oil. (L. S)	483
Sherbrook & Hallman.	D.	1,595	6½	.....	.....	.....	.....	1905	Gas and water at 300 and 600 feet; salt water at 750-800 feet; show of oil at 1,125-1,190 feet; dry hole. (L. S.)	484
A. J. Laird.....	D.	258	10½-6½	150	- 14	.....	400	1905	Water at 205 and 248 feet; hard. (L.)	485
P. Ackerman and T. Hodgden.	C.	1,715	.....	.....	.....	.....	.....	1905	Water at 418-420, 472-492, and 1,035-1,395 feet. (L.)	486
.....do.....	C.	1,457	6½-4½	.....	.....	.....	.....	1905	"Mississippi limestone" at 1,457 feet. (L.)	487
W. S. Smullin.....	M.	930	8½-6½	.....	Flows.	.....	.....	1905	Slight flow of gas at 802 feet; salt water at 925 feet. (L.)	488

KANSAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
489	Water..	Crawford.....	Pittsburg.....	Atchison, Topeka and Santa Fe Rwy.	Bailey & Waugh..
490		Finney.....	Garden.....		
491	do...	Ford.....	Dodge City.....	do.....	
492	Oil.....	Geary.....	Junction City, 3 m. W. of, sec. 10, T. 12, R. 5, well No. 1 on Munson farm.		O. A. Kentner...
493	do...	do.....	Junction City, 3 1/2 m. SW. of, sec. 16, T. 12, R. 5, on Rockwell estate farm.	G. Rockwell estate	do.....
494	Water..	Gray.....	Sec. 16, T. 29, R. 30.....	Wm. Johnson.....	
495	do...	do.....	Cimarron.....	Atchison, Topeka and Santa Fe Rwy.	
496	do...	Kearny.....	Lakin.....	do.....	
497	do...	Labette.....	Chetopa, 1/2 m. E. of, sec. 35, T. 35, R. 21.	City of Chetopa.....	
498	Gas.....	McPherson.....	McPherson, 3 m. W. of.	B. A. Allison.....	
499	Oil.....	Marshall.....	Vleits, 5 m. N. of, sec. 17, T. 4, R. 10.	Sunflower Coal, Gas and Oil Co.	
500	Water..	Mitchell.....	Victor, 2 m. W. of, sec. 22, T. 9, R. 9.	Adam Beeler.....	Isaac C. Rhoads..
501	Oil.....	Montgomery.....	Caney.....	Caney Deep Well Co	
502	Gas.....	do.....	Deering, Wakeman farm No. 1.	Yoke & Brown.....	
503	Oil.....	do.....	Independence Township, sec. 16, H. M. Provorse farm, well No. 5.	Nelson Oil Co. and McBride.	St. Marys Drilling Co.
504	do...	do.....	Rutland Township, sec. 28, T. W. Brownlee farm, well No. 1.	Nelson Oil Co.....	do.....
505	do...	do.....	Rutland Township, sec. 28, T. W. Brownlee farm, well No. 3.	do.....	do.....
506	do...	Neosho.....	SE. 1/4 of SE. 1/4, sec. 10, T. 27, R. 18.	I. N. Knapp.....	
507	do...	do.....	SE. 1/4 of SW. 1/4, sec. 15, T. 27, R. 18.	do.....	

See detailed record at end of table.

SUMMARY OF DRILLING.

71

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
		<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>			
		980			-122			1905		489
S. W. Sunday.....	M.	150	12-6½				25	1900	Water at 8-50 feet, hard; 59-63, 66-77, 101-115, 123-129 feet, soft. (L.)	490
A. Fasig.....	M.	146	10-5	120			35	1900	Water at 22-39 feet, hard; 56-93, 120-141 feet, soft. (L.)	491
Sticelehr & Tuite ..	M.	1,930	10-4½		Flows.			1905	Fresh water at 25-30 feet; salt, at 455, 565, 1,030, 1,300, and heavy flow at 1,930 feet; show of oil; well abandoned. (L.)	492
Ladley.....	M.	1,365						1905	Salt water at 950 feet; strong flow; abandoned.	493
J. H. Ellis.....	D.	225		218	-135		16		Water at 218-225 feet. (L.)	494
S. W. Sunday.....	M.	129	12-10				20	1900	Water at 25-45 feet, hard; 73-114 feet, soft. (L.)	495
A. Fasig.....	M.	184	12-9½				20	1901	Water at 12-30 feet, hard; 55-66 and 156-176 feet, soft. (L.)	496
Chas. F. Noble.....	M.	1,102	8½-6½	875	+ 4	15		1905	Soft water at 975 feet.	497
Gasser & Ward.....	M.	2,225						1905	(S.)	498
D. M. Brenner.....	M.	1,300	8-5½						Water at 100-150, 400-425, 900-945 feet; drilled for oil.	499
Isaac C. Rhoads..	D.	253	6½	240	-200			1901	Water salty; not used.	500
	M.	2,423	8½		-243				Not completed; show of gas at 1,822-1,953 feet; water salty; deepest well in Kansas. (L. S.)	501
E. H. Kennedy and A. O. Os-good.	O.	1,038	8½					1904	Oil at 376 feet; water at 398 feet; gas at 936 feet; yield of gas, 7,000,000 cubic feet in 24 hours. (L.)	502
	C.	1,222	10-6½				b 30	1904	Top oil sand at 1,175 feet, 27 feet thick, first showing oil at 1,185 feet.	503
	C.	790	8½-6½				b 30	1904	Top oil sand at 715 feet, first showing oil at 725 feet.	504
	C.	1,335	8½-6½					1904	Top oil sand at 706 feet, first oil showing at 710 feet; poor showing after shot.	505
	O.	785						1905	(S.)	506
	O.	754						1905	(S.)	507

b Barrels a day.

Summary of well drilling

KANSAS--Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
508	Oil.....	Neosho.....	Tioga Township, sec. 22, T. 27, R. 18, Allen Bros. farm.	I. N. Knapp.....	
509	do.....	do.....	Tioga Township, S. E. Beach farm.	do.....	
510	do.....	do.....	Tioga Township, sec. 9, T. 27, R. 18, A. F. Blackburn.	do.....	
511	Gas.....	do.....	Tioga Township, sec. 21, T. 27, R. 18, Chanute power house, lot No. 1.	do.....	
512	do.....	do.....	Chanute, 3 m. W. and $\frac{1}{2}$ m. S. of, well No. 29.	Kansas Hydraulic Pressed Brick Co.	Loy & Wilson Drilling Co.
513	do.....	do.....	Chanute, 1 m. W. and 1 m. S. of, well No. 1 on Bodel farm.		do.....
514	do.....	do.....	Chanute, 1 m. E. and 1 m. S. of, well No. 2, on Bodel farm.		do.....
515	Oil.....	do.....	Chanute, 2 $\frac{1}{2}$ m. W. and 1 m. S. of, well No. 1, on Bowers farm.	West Plant Oil Co.	do.....
516	do.....	do.....	Chanute, 2 $\frac{1}{2}$ m. W. and $\frac{1}{2}$ m. S. of, well No. 4, on Bowers farm.	do.....	do.....
517	do.....	do.....	Chanute, 2 m. W. and $\frac{1}{2}$ m. S. of, well No. 23, on Chappel farm.	do.....	do.....
518		do.....	{Tioga Township, sec. 22, T. 27, R. 18, R. M. Cox farm.	I. N. Knapp.....	
519	Gas.....	do.....	Tioga Township, sec. 24, T. 27, R. 17, Dearborn farm, well No. 1.	do.....	
520	do.....	do.....	Tioga Township, sec. 27, T. 27, R. 18, C. W. Ditmar, well No. 1.	do.....	
521	Oil.....	do.....	{Tioga Township, G. W. Ditmar farm.	do.....	
522		do.....	Tioga Township, Wm. Hanson farm, well No. 2.	do.....	
523	Oil.....	do.....	Chanute, 2 $\frac{1}{2}$ m. S. of, well No. 3, on Hanson farm.	Omaha Petroleum Co.	Loy & Wilson....
524		do.....	Tioga Township, sec. 22, T. 27, R. 18, Eliza Hetrick farm.	I. N. Knapp.....	
525		do.....	{Tioga Township, sec. 9, T. 27, R. 18, D. L. Houston farm.	do.....	
526	Oil.....	do.....	Chanute, 2 m. S. of, well No. 5, on Houston farm.	Home Oil and Gas Co.	Loy & Wilson Drilling Co.
527	do.....	do.....	Chanute, 2 m. W. and 1 m. S. of, well No. 2, on Hanson farm.	Omaha Petroleum Co.	do.....

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	O.	{ 775 835 }							5 wells. (L.)	508
	O.	{ 732 825 }							14 wells. (L.)	509
	O.	{ 740 782 }						1902	(S. L.)	510
	O.	825	8½-5					1901	Initial flow, 700,000 cubic feet; gas at 323-337 feet; water at 474 feet; show of oil at 763 feet; gas sand at 796 feet. (L.)	511
J. W. Hilton and J. F. Wilson.	C.	928	8½-4½					1904	Gas sand at 903 feet. (L.)	512
W. Hilton and James Wilson.	C.	840	8½-4½					1904	(L.)	513
	C.	867	8½-4½						Oil sand at 848-856 feet. (L.)	514
T. Hodgden.	C.	968	8½-4½					1903	Gas sand at 912-920 feet; oil sand at 920-968 feet. (L.)	515
	C.	910	8½-4½					1904	Oil sand at 888-900 feet. (L.)	516
P. Ackerman and T. Hodgden.	C.	910	8½-4½					1904	Oil sand at 890-903 feet. (L.)	517
	O.	{ 741 848 }							{ 5 oil wells; 1 dry hole. (L.) }	518
	O.	860						1903	Show of oil at 785 feet; gas at 845 feet; initial pressure 245 pounds; flow 2-inch pipe 1,140,500 cubic feet. (L. S.)	519
	O.	794						1904	(L.)	520
	O.	{ 748 816 }							13 wells. (L.)	521
	O.	931						1903	Salt water at 929 feet; dry hole. (L.)	522
John Mitchell and Earnest Moore.	C.		8½-4½					1904	Oil sand at 835-837 feet. (L.)	523
	O.	740							24 wells, 23 oil, 1 gas. (L.)	524
	O.	{ 507 844 }							4 wells. (L.)	525
J. F. Wilson and P. Ackerman.	C.	767	8½-4½					1905	Oil sand at 742-759 feet. (L.)	526
A. A. Ackerman and Frank Raemis.	C.	915	8½-4½					1904	Dry hole. (L.)	527

Summary of well drilling

KANSAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
528	Gas.....	Neosho.....	Chanute, 2½ m. E. of, well No. 5, on Rush farm.	City of Chanute....	Loy & Wilson Drilling Co.
529	.....do.....	.....do.....	Chanute, 2½ m. E. of, well No. 6, on Rush farm.	.....do.....	.....do.....
530	.....do.....	.....do.....	Chanute, 2 m. W. of, well No. 5, on Russell farm.	Minnesota-Kansas Oil and Gas Co.	.....do.....
531	Oil.....	.....do.....	Chanute, 2 m. W. of, well No. 5, on Russell farm.	.....do.....	.....do.....
532	.....do.....	.....do.....	Chanute, 8 m. S. of, well No. 1, on Rosier farm.	G. M. Rosier.....	.....do.....
533	.....do.....	.....do.....	{Tioga Township, sec. 27, T. 27, R. 18, W. J. Sheldon.	I. N. Knapp.....	.....do.....
534	.....do.....	.....do.....	{Tioga Township, sec. 15, T. 27, R. 18, Chas. Startup.	.....do.....	.....do.....
535	.....do.....	.....do.....	Tioga Township, sec. 16, T. 27, R. 18, B. M. Smith, well No. 1.	.....do.....	.....do.....
536	Gas.....	.....do.....	Chanute, 2 m. S. and ½ m. E. of, well No. 1 on Doctor Swinney farm.	W. C. Allen.....	Loy & Wilson Drilling Co.
537	.....do.....	.....do.....	{Tioga Township, sec. 30, T. 27, R. 18, G. H. Switzer.	I. N. Knapp.....	.....do.....
538	.....do.....	.....do.....	{Tioga Township, sec. 3, T. 27, R. 18, V. B. Stone.	.....do.....	.....do.....
539	Oil.....	.....do.....	{Tioga Township, sec. 23, T. 27, R. 18.	.....do.....	.....do.....
540	.....do.....	.....do.....	Chanute, 2 m. S. and 3 m. S. of, well No. 2, on Willis farm.	A. E. Willis.....	Loy & Wilson Drilling Co.
541	.....do.....	.....do.....	Shaw, 2½ m. NW. of sec. 4, T. 28, R. 19, J. W. Mathes farm, well No. 1.	.....do.....	Stewart & Merkle.
542	.....do.....	.....do.....	Shaw, 2½ m. NW. of, sec. 9; T. 28, R. 19, A. B. Mathes farm, well No. 2.	.....do.....	Merkle & Stewart.
543	.....do.....	.....do.....	Chanute, 3 m. W. of, well No. 10, on Jones farm.	Boss Oil and Gas Co.	Loy & Wilson Drilling Co.
544	.....do.....	.....do.....	Chanute, 3 m. W. and ¾ m. S. of, on King farm.	Fairview Oil and Gas Co.	.....do.....
545	.....do.....	.....do.....	Tioga Township, sec. 19, T. 27, R. 18, Jno. Kuhner farm, well No. 1.	I. N. Knapp.....	.....do.....

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. W. Hilton and J. F. Wilson.	C.	759	8½-4½	.....	.....	.....	.....	1904	Oil sand at 759-762 feet; gas sand at 818-835 feet; showed 8,000,000 cubic feet gas in 24 hours. (L.)	528
.....do.....	C.	820	8½-4½	.....	.....	.....	.....	1904	Gas sand at 802-820 feet; showed 9,000,000 cubic feet gas in 24 hours. (L.)	529
J. W. Hilton and P. Ackerman.	C.	974	6½-4½	.....	.....	.....	.....	1904	No oil or gas reported. (L.)	530
Hilton and Wilson.	C.	915	.....	.....	.....	.....	.....	.....	Oil sand at 877-902 feet. (L.)	531
P. Ackerman and T. Hodgden.	C.	981	6½-4½	.....	.....	.....	.....	1904	Oil sand at 905-981 feet. (L.)	532
.....	O.	{ 752 815 }	8½-5	.....	.....	.....	.....	.....	{ 17 wells, 14 oil, 1 gas, 2 dry holes. (L.) }	533
.....	O.	{ 854 894 }	8½-5	.....	.....	.....	.....	1902	{ 2 wells; dry holes. (L.) }	534
.....	O.	838	8½-5	.....	.....	.....	.....	1901	Water at 475-532 feet; gas sand, no gas, at 814 feet; salt water at 838 feet; dry hole. (L.)	535
.....	C.	891	8½-4½	.....	.....	.....	.....	1905	Salt water sand at 886-891 feet. (L.)	536
.....	O.	{ 910 936 }	8½-5	.....	.....	.....	.....	1903	{ 2 wells, 1 dry hole, 1 gas. (L.) }	537
.....	O.	{ 830 865 }	8½-5	.....	.....	.....	.....	1902	2 wells, dry holes. (L.)	538
.....	O.	{ 830 835 }	.....	.....	.....	.....	.....	.....	{ Water at 450 feet; gas at 495 feet; oil at 738 feet. (L.) }	539
P. Ackerman and Earnest Moore.	C.	828	8½-4½	.....	.....	.....	.....	1905	Oil sand at 790-806 feet. (L.)	540
Matt Merkle.....	M.	730	8½-6½	613	.....	.....	a 75	1903	Water at 23-29 feet. (L.)	541
.....do.....	M.	652	8½-4½	609	.....	.....	a 100	1903	Water at 27-30, 258-268 feet; gas at 593-609 feet; oil at 609-641 feet. (L.)	542
J. W. Hilton and J. F. Wilson.	C.	908	8½-4½	.....	.....	.....	.....	1904	Oil sand at 878-901 feet. (L.)	543
E. Moore and J. Mitchell.	C.	1,003	8½-4½	.....	.....	.....	.....	1904	Gas sand at 830-850 feet. (L.)	544
.....	O.	876	.....	.....	.....	.....	.....	1902	Dry hole. (L.)	545

a Barrels a day.

*Summary of well drilling***KANSAS—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
546	Gas.....	Neosho.....	Chanute, 3 m. E. and 1 m. N. of, well No. 3, on Lapham farm.	Lapham.....	Loy & Wilson Drilling Co.
547	.....	do.....	Chanute, 2 m. W. and 3 m. S. of, well No. 2, on Logan farm.	Interstate Oil and Gas Co.	.....do.....
548	.....	do.....	Tioga Township, J. T. Lucas farm, well No. 1.	I. N. Knapp.....	.....
549	Oil.....	do.....	Chanute, 2½ m. W. and 1 m. S. of, well No. 7, on McGowen farm.	Kansas Vitrified Brick Co.	Loy & Wilson Drilling Co.
550	Gas.....	do.....	Chanute, 6 m. W. and 1 m. S. of, on Marks farm.	G. M. McIntosh.....	.....do.....
551	.....	do.....	Tioga Township, sec. 29, T. 27, R. 18, C. S. Nation, well No. 1.	I. N. Knapp.....	.....
552	.....	do.....	Tioga Township, sec. 29, T. 27, R. 18, W. H. Neyhard farm.	do.....	.....
553	Gas.....	do.....	Tioga Township, sec. 27, T. 27, R. 18, Ogden heirs well, No. 1.	do.....	.....
554	Oil.....	do.....	Chanute, 8 m. NE. of, well No. 1, on Phebus farm.	Nicollet Crude Oil Co.	Loy & Wilson Drilling Co.
555	.....	do.....	Tioga Township, sec. 15, T. 27, R. 18, L. Rosenthal farm.	I. N. Knapp.....	.....
556	Water..	Ottawa.....	Delphos, 7 m. SW. of, sec. 23.	Wilmer Eames.....	.....
557	do.....	do.....	Delphos, 4½ m. E. of....	John Stauffer.....	L. S. Zimmerman.
558	Oil.....	Pottawatomie..	Wamego, 4 m. W. of, sec. 2, T. 10, R. 9.	Mid Continental Oil and Gas Co.	.....
559	Water..	Republic.....	Cuba, ½ m. S. of.....	Rock Island R. R.	.....
560	Oil.....	Seneca.....	Jackson Township, Frank Harrison farm.	.....	.....
561	.....	Wilson.....	Sec. 11, T. 29, R. 16.....	I. N. Knapp.....	.....
562	.....	do.....	.....	do.....	.....
563	.....	do.....	.....	do.....	.....
564	Gas.....	do.....	Cedar Township, sec. 11, T. 29, R. 16, well No. 1, on G. Alexander farm.	do.....	H. Rages & Co...
565	do.....	do.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 1, on Mary Brewer farm.	do.....	Falwell & Carver.
566	do.....	do.....	Cedar Township, sec. 29, T. 16, R. 10, well No. 1, S. W. Campbell farm.	do.....	.....do.....

SUMMARY OF DRILLING.

77

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth. Ft.	Diameter. In.	Depth to principal water or oil supply. Ft.	Height of water. Ft.	Yield per minute.		Year completed.	Remarks.	No.
						Flow. Gals.	Pump. Gals.			
P. Ackerman and T. Hodgden.	C.	.....	10-6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Oil sand at 745-755 feet; 795-805 feet; gas sand at 840-848 feet; showed 6,000,000 cubic feet. (L.)	546
John Mitchell and Earnest Moore.	C.	948	8 $\frac{1}{2}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1904	Oil sand at 850-870 feet; salt sand at 945 feet; dry hole. (L.)	547
.....	O.	849	.....	.....	.....	.....	.....	1903	Slight show of gas at 835 feet; dry hole. (L.)	548
.....	C.	940	.....	.....	.....	.....	.....	1903	Oil sands at 901-909 and 919-923 feet. (L.)	549
A. A. Ackerman and H. W. Loy.	C.	955	.....	.....	.....	.....	.....	1904	Gas at 455-465, 742-762, and 937-955 feet. (L.)	550
.....	O.	905	.....	.....	.....	.....	.....	.....	Dry hole. (L.)	551
.....	O.	920	8 $\frac{1}{2}$ -5	.....	.....	.....	.....	.....	Oil sand at 790 feet; show of gas at 870 feet; dry hole. (L.)	552
.....	O.	797	8 $\frac{1}{2}$ -5	.....	.....	.....	.....	1902	Oil sand, no oil, at 716 feet; gas sand at 787 feet; strong flow. (L.)	553
.....	C.	849	.....	.....	.....	.....	.....	1904	Water at 235, 575, and 615 feet; oil sand at 826-842 feet. (L.)	554
.....	O.	{ 750 825 }	.....	.....	.....	.....	.....	.....	{ 1 oil well; 2 dry holes. (L.) }	555
M. R. Powell.	D.	150	5 $\frac{1}{2}$	140	-100	.....	.....	1905	Hard water.	556
.....do.	D.	186	5	176	-40	.....	15	1905	(L.)	557
Jas. Byron.	O.	895	10-6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Fresh water at 366 feet; salt water at 427 feet; shows of oil at 646, 699, and 865 feet. (L. S.)	558
B. A. Lorimor.	D.	198	6	185	-30	.....	.....	.....	(L.)	559
Rinebold Bros.	D.	1,305	.....	.....	.....	.....	.....	1905	(L. S.)	560
.....	O.	900	.....	.....	.....	.....	.....	1905	(S.)	561
.....	O.	898	.....	.....	.....	.....	.....	1905	(S.)	562
.....	O.	855	.....	.....	.....	.....	.....	1905	(S.)	563
.....	O.	760	8 $\frac{1}{2}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Gas at 470, 732, and 752 feet; open flow 7,250,000 cubic feet. (L.)	564
.....	O.	911	8 $\frac{1}{2}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Water at 240 feet; gas sand at 883 feet; initial flow 6,075,000 cubic feet. (L.)	565
.....	O.	900	8 $\frac{1}{2}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Gas at 870 feet; initial flow 4,000,000 cubic feet; rock pressure 350 pounds. (L.)	566

*Summary of well drilling***KANSAS—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
567	Gas.....	Wilson.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 1, on M. Carver farm.	I. N. Knapp.....	Falwell & Carver.
568	...do.....	...do.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 2, M. Carver farm.	...do.....	...do.....
569	...do.....	...do.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 3, M. Carver farm.	...do.....	...do.....
570	...do.....	...do.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 4, M. Carver farm.	...do.....	...do.....
571	...do.....	...do.....	Cedar Township, sec. 9, T. 27, R. 16, well No. 5, M. Carver farm.	...do.....	...do.....
572	...do.....	...do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 1, I. W. Cole farm.	...do.....	...do.....
573	...do.....	...do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 2, I. W. Cole farm.	...do.....	...do.....
574	...do.....	...do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 3, on I. W. Cole farm.	...do.....	...do.....
575	...do.....	...do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 4, on I. W. Cole farm.	...do.....	...do.....
576	...do.....	...do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 1, on Abe Cronkhite farm.	...do.....	...do.....
577	...do.....	...do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 1, on Cora Cronkhite farm.	...do.....	...do.....
578	...do.....	...do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 2, Cora Cronkhite farm.	...do.....	...do.....
579	...do.....	...do.....	Cedar Township, sec. 2, T. 29, R. 18, well No. 1, Smith Day farm.	...do.....	Brigner & Blair...
580	...do.....	...do.....	Cedar Township, sec. 2, T. 29, R. 16, well No. 2, on Smith Day farm..	...do.....	...do.....
581	...do.....	...do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 1, Wyatt De Balt farm.	...do.....	Falwell & Carver.

SUMMARY OF DRILLING.

79

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	O.	905	8½-4½	.....	.....	.....	.....	1904	Gas and some water at 235 feet; gas sand at 892 feet; initial flow 5,000,000 cubic feet. (L.)	567
.....	O.	912	8½-4½	.....	.....	.....	.....	1904	Gas sand at 890 feet; initial flow 5,000,000 cubic feet. (L.)	568
.....	O.	912	8½-4½	.....	.....	.....	.....	1904	Water at 39 feet; initial flow gas 5,000,000 cubic feet; initial pressure 350 pounds. (L.)	569
.....	O.	912	8½-4½	.....	.....	.....	.....	1904	Gas sand at 900 feet; initial flow 3,500,000 cubic feet. (L.)	570
.....	O.	913	8½-4½	.....	.....	.....	.....	1904	Gas sand at 888 feet; initial flow 6,000,000 cubic feet. (L.)	571
.....	O.	855	8½-5	.....	.....	.....	.....	1903	Gas at 848 feet; rock pressure 364 pounds; open flow of gas 2,700,000 cubic feet. (L.)	572
.....	O.	868	8½-4½	.....	.....	.....	.....	1904	Water and gas at 606 feet; gas sand at 845 feet; initial flow 4,250,000 cubic feet. (L.)	573
.....	O.	910	8½-4½	.....	.....	.....	.....	1904	Water and gas at 640 feet; gas sand at 883 feet; initial flow 5,000,000 cubic feet. (L.)	574
.....	O.	920	8½-4½	.....	.....	.....	.....	1904	Water at 219 feet; gas at 595 feet; gas sand at 892 feet; initial flow 3,925,800 cubic feet; initial pressure 320 pounds. (L.)	575
.....	O.	898	6½-5	.....	.....	.....	.....	1903	Water at 637 feet; gas at 870 feet; initial flow 4,846,000 cubic feet. (L.)	576
.....	O.	879	8½-5	.....	.....	.....	.....	1903	Gas at 620 and 865 feet; open flow 3,925,000 cubic feet; rock pressure 320 pounds. (L.)	577
.....	O.	884	8½-4½	.....	.....	.....	.....	1904	Water and gas at 615 feet; gas sand at 861 feet; initial flow 5,000,000 cubic feet. (L.)	578
.....	O.	770	8½-5	.....	.....	.....	.....	1903	Rock pressure 312 pounds; open flow 6,075,000 cubic feet. (L.)	579
.....	O.	775	8½-5	.....	.....	.....	.....	1903	Estimated open flow 13,050,000 cubic feet; rock pressure 312 pounds. (L.)	580
.....	O.	900	8½-4½	.....	.....	.....	.....	1903	Open flow of gas 4,105,900 cubic feet. (L.)	581

Summary of well drilling

KANSAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
582	Gas.....	Wilson.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 2, W. De Balt farm.	I. N. Knapp.....	Falwell & Carver.
583	do.....	do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 1, on Doug. Hite farm.	do.....	do.....
584	do.....	do.....	Cedar Township, sec. 15, T. 29, R. 16, well No. 1, on Eli Hite farm.	do.....	do.....
585	do.....	do.....	Cedar Township, sec. 8, T. 29, R. 16, well No. 1, W. H. Hite farm.	do.....	do.....
586	Gas.....	do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 1, C. A. Johnston farm.	do.....	do.....
587	do.....	do.....	Cedar Township, sec. 10, T. 29, R. 16, well No. 1, Franklin Neff farm.	do.....	do.....
588	do.....	do.....	Cedar Township, sec. 4, T. 29, R. 16, well No. 1, R. N. Richardson farm.	do.....	do.....
589	do.....	do.....	Cedar Township, sec. 3, T. 29, R. 16, well No. 1, H. C. Smook farm.	do.....	do.....
590	Gas.....	do.....	Chetopa Township, sec. 2, T. 29, R. 16, well No. 3, Smith Day farm.	do.....	Brigner & Bair...
591	do.....	do.....	Chetopa Township, sec. 11, T. 29, R. 16, well No. 1, J. H. Depuy farm.	do.....	H. Rages & Co...
592	Gas.....	do.....	Chetopa Township, sec. 2, T. 29, R. 16, well No. 4, Smith Day farm.	do.....	C. W. Brigner.....
593	do.....	do.....	Chetopa Township, sec. 11, T. 29, R. 16, well No. 1, on Cornelia Mason farm.	do.....	do.....
594	do.....	do.....	Chetopa Township, sec. 2, T. 29, R. 16, well No. 1, J. W. Jenkins farm.	do.....	do.....
595	do.....	do.....	Guilford Township, sec. 32, T. 28, R. 16, well No. 1, Thos. Miller farm.	do.....	M. M. Seever & Sons.
596	do.....	do.....	Pleasant Valley Township, sec. 33, T. 28, R. 16, well No. 1, C. D. Connell farm.	do.....	do.....

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	O.	914	8½-4½	.....	.....	.....	.....	1904	Initial flow 5,000,000 cubic feet. (L.)	582
.....	O.	881	8½-4½	.....	.....	.....	.....	1903	Gas sand at 849 feet; open flow 6,200,000 cubic feet; rock pressure 375 pounds. (L.)	583
.....	O.	905	8½-4½	.....	.....	.....	.....	1903	Gas at 575 and 871 feet; initial pressure 373 pounds; open flow 5,850,000 cubic feet. (L.)	584
.....	O.	905	8½-4½	.....	.....	.....	.....	1904	Water at 132 and 630 feet; dry hole. (L.)	585
.....	O.	915	8½-4½	.....	.....	.....	.....	1904	Water at 647 feet; show of oil at 816; gas sand at 887; initial flow 5,000,000 cubic feet; initial pressure 325 pounds. (L.)	586
.....	O.	936	8½-4½	.....	.....	.....	.....	1903	Show of oil at 858 feet; salt water at 932 feet; dry hole. (L.)	587
.....	O.	992	8½-4½	.....	.....	.....	.....	1904	Salt water at 980 feet; show of gas at 581 feet; dry hole. (L.)	588
.....	O.	932	8½-4½	.....	.....	.....	.....	1903	Water at 250 feet; water and gas at 505 feet; dry hole. (L.)	589
.....	O.	760	8½-4½	.....	.....	.....	.....	1903	Gas and water at 480 feet; gas sand at 731 feet; gas at 742 feet; open flow 6,420,000 cubic feet. (L.)	590
.....	O.	798	6½-4½	.....	.....	.....	.....	1903	Gas and water at 487 feet; oil show at 782 feet; dry hole. (L.)	591
.....	O.	759	8½-4½	.....	.....	.....	.....	1903	Gas sand at 729 feet; open flow 6,738,000 cubic feet. (L.)	592
.....	O.	755	8½-4½	.....	.....	.....	.....	1903	Gas sand at 730 feet; initial pressure 290 pounds; open flows 6,075,000 cubic feet. (L.)	593
.....	O.	784	8½-4½	.....	.....	.....	.....	1903	Dry hole; showing of oil at 645 feet; salt water at 781 feet. (L.)	594
.....	O.	979	8½-4½	.....	.....	.....	.....	1904	Dry hole; some gas at 425 feet. (L.)	595
.....	O.	958	8½-4½	.....	.....	.....	.....	1904	Gas at 413 and 725 feet; salt water at 525 feet; show of oil at 880 feet; dry hole. (L.)	596

*Summary of well drilling***KANSAS**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
597	Gas.....	Wilson.....	Pleasant Valley Town- ship, sec. 35, T. 28, R. 16, well No. 1, on De- puy Bros. farm.	I. N. Knapp.....	C. W. Brigner....
598	.....	do.....	Pleasant Valley Town- ship, sec. 29, T. 28, R. 16, well No. 1, Marg- aret Thomas farm.	do.....	M. M. Seever & Sons.
599	.....	do.....	Pleasant Valley Town- ship, sec. 35, T. 28, R. 16, well No. 1, Tomlin- son farm.	do.....	C. W. Brigner....
600	.....	do.....	Pleasant Valley Town- ship, sec. 27, T. 28, R. 16, well No. 1, on A. Towsend farm.	do.....	M. M. Seever & Son.
601	Gas.....	do.....	Tioga Township, well No. 21, on Spencer Smith farm.	do.....	.....
.....	do.....	do.....	Well No. 1, on S. E. Stanley farm, sec. 10, T. 29, R. 16.	do.....	Falwell & Carver..
602	do.....	Woodson.....	Yates Center, $\frac{1}{2}$ m. west of, sec. 16, T. 25, R. 15.	Charles & Means...	Gas City Drilling Co.
603	do.....	Wyandotte.....	Argentine, $\frac{1}{2}$ m. SE. of.	J. A. Paullin.....	J. A. Paullin, well No. 2.
604	Water.....	do.....	Bonner Springs.....	T. B. Wood.....	.....
^a 605	Oil.....	do.....	Bonner Springs, sec. 21, T. 11, R. 23, well No. 1, 2 m. NE. of Thomas Kinahan.	do.....	T. B. Wood.....
^a 606	.....	do.....	Bonner Springs, $\frac{1}{2}$ m. N. of.	.....	C. L. Bloom.....

KENTUCKY.

607	Water..	Ballard.....	Barlow, 2 m. NW. of...	Richard Johnson..	.....
608	do.....	do.....	Kevil, Wallace avenue..	Kevil Improvement Co.	W. L. Beck.....
609	do.....	do.....	Wickliffe, $3\frac{1}{2}$ m. N. of...	John Coat.....	.....
610	Oil.....	Barren.....	Oil City, $1\frac{1}{2}$ m. SE. of, well No. 6, on H. A. Jordan farm.	J. E. Cully.....	.....
611	do.....	do.....	Oil City, $1\frac{1}{2}$ m. SE. of, well No. 7, on H. A. Jordan farm.	do.....	.....

^a See detailed record at end of table,

SUMMARY OF DRILLING.

83

reported in 1905—Continued.

KANSAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	O.	806	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Small flow. (L.).....	597
.....	O.	1,090	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1905	Dry hole; water at 815 feet. (L.)	598
.....	O.	690	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Dry hole. (L.)	599
.....	O.	990	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1904	Water at 715 feet; dry hole. (L.)	600
.....	O.	805	.....	.....	.....	.....	.....	1904	Gas at 305 and 768 feet; water at 500 feet. (L.)	601
.....	O.	932	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1903	Oil sand at 820 feet; gas at 900 feet. (L.)	.....
George Thompson.	O.	1,560	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1905	Salt water at 300, 500 and 1,160 feet (abandoned); mineral water at 490 and 1,560 feet; gas sand at 1,530 feet. (L.)	602
.....	O.	323	8 $\frac{1}{4}$	139	.....	.....	.....	1904	Salt water; 1 of 4 wells; fourth yields about 1 barrel of lubricating oil in 24 hours; 25,000 cubic feet first 24 hours; pressure 65 pounds at 139 feet. (L.)	603
O. A. Rainey.....	O.	547	.....	.....	.....	.....	.....	1905	(L.).....	604
T. B. Wood.....	O.	853	10-6 $\frac{1}{2}$	770	.....	.....	.....	1904	Gas at 440 feet; 200,000 cubic feet in 24 hours; pressure 120 pounds; salt water at 770 feet; trace of oil at 505 feet. (L. S.)	605
.....	M.	2,150	8 $\frac{1}{4}$ -4 $\frac{3}{8}$	.....	.....	.....	.....	1899	(L.).....	606

KENTUCKY.

S. D. Butler.....	D.	139	3	124	-110	.....	10	1903	Soft water; water at 80 feet also.	607
W. L. Beck.....	D.	125	2	93	- 90	.....	.....	1903	2 wells; slightly iron and sulphur water. (L.)	608
S. D. Butler.....	D.	154	3	142	-138	.....	10	1902	Water at 50 and 120 feet; soft water.	609
J. E. Cully.....	O.	365	5 $\frac{1}{8}$	.....	.....	.....	^b 9	1904	Water at 14 feet; strong sulphur water at 200 feet. (L.)	610
.....do.....	O.	605	10-6 $\frac{1}{2}$	.....	- 20	.....	.....	1904	Sulphur water at 40 feet; salt water at 310 feet. (L.)	611

^b Barrels a day.

Summary of well drilling

KENTUCKY—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
612	Oil.....	Barren.....	Haywood, 1½ m. W. of.	Ellis, Cully & Ralston.	
613	Water.....	do.....	Hiseville, 3 m. N. of....	G. B. Edwards.....	
614	do.....	do.....	Nobob, 1½ m. E. of.....	Sallie Payne.....	
615		Bracken.....	Brooksville, ¼ m. W. of.	Bracken County Bank.	
616	Oil.....	do.....	do.....	Brooksville Oil and Gas Co.	
617	Water..	Callaway.....	Murray.....	Nashville, Chattanooga and St. Louis R. R.	
618	do.....	Clay.....	Kearney, 7 m. W. of....	H. D. Anderson.....	
619	do.....	Coldwell.....	Princeton, 1 m. E. of....	McNeely.....	
620	do.....	Crittenden.....	Marion, 3 m. E. of.....	Frank Conger.....	
621	Oil.....	Cumberland.....	Clyde Landing, 1 m. SW. of.	Consolidated Producers' Oil Co.	
622	Water..	Hardin.....	Hadgenville, 1 m. W. of.	Robert McDowell..	
623	do.....	Hart.....	Seymour, 1½ m. W. of..	W. E. Cook.....	
624	do.....	Hopkins.....	Charleston, ¼ m. N. of..	Public school.....	
625	do.....	do.....	Hamburg.....	R. E. Robinson.....	
a 626		do.....	Nebo.....	D. J. Terhume.....	E. F. Doudna.....
627		do.....	do.....	do.....	
628	Water..	do.....	Onton, 3 m. S. of.....	Elijah Browning..	
629	do.....	McCracken.....	Woodville, Main street.	H. L. McGuire.....	
a 630	Oil.....	Metcalfe.....	Edmonton, 2 m. E. of..	Trend Oil and Pipe Line Co.	H. L. Sturm.....
630a	Water..	Nelson.....	Trappist, 1¾ m. N. of....	Abbey of Gethsemane.	T. Bridges.....
631	do.....	Union.....	Morganfield, ½ m. N. of.	Town of Morganfield and H. M. Quirez Ice Plant.	
632	Oil.....	Warren.....	Bowling Green, 5 m. W. of.	W. A. Davenport...	Warren Petroleum Co.
633	Water..	do.....	Little Muddy, 3 m. E. of	Carly Tuck.....	
634	do.....	do.....	Smiths Grove.....	J. R. Kirby.....	
635	do.....	do.....	Smiths Grove, ¾ m. W. of.	L. C. J. Mottley.....	
636	do.....	Webster.....	Blackford, 3 m. NE. of..	H. Wells.....	

a See detailed record at end of table.

reported in 1905—Continued.

KENTUCKY—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. E. Cully.....	D.	305	10½-5½	.....	- 10	.....	.....	1904	Trace of oil at 165 feet; strong sulphur water, not used, at 160 feet. (L.)	612
Vancleave.....	O.	110	6	110	- 75	.....	.....	1901	Hard.....	613
R. G. Alexander...	D.	100	6	96	- 4	.....	20	1905	.....do.....	614
John Brown.....	D.	1,800	.....	.....	-400	.....	.....	.....	Fresh water at 79 feet; salt water at 800 feet; sulphur water at 950 feet; show of oil at 1,020 feet. (L.)	615
.....	.....	1,900	8-5	.....	.....	.....	.....	.....	Fresh water at 75 feet; salt water at 800 feet; sulphur water at 1,000 feet; uncompleted.	616
E. F. Doudna.....	D.	215	6	200	- 52	.....	75	1904	Used for locomotive supply.	617
Wm. S. Whitcomb.	D.	320	6	315	-290	.....	.....	1890	Water soft and salty. (L.)	618
Jas. M. Gentry....	D.	193	6	180	-100	.....	.....	.....	Soft water.....	619
.....do.....	D.	134	5½	110	-100	.....	.....	1901	Sulphur water.....	620
Bert Crosier.....	M.	830	6½	800	.....	.....	.....	1905	Fresh water above 150 feet; salt water at 225 feet.	621
Charles Lewis.....	D.	120	6	80	- 50	.....	9	1905	Soft water; also at 80 and 105 feet.	622
W. E. Cook.....	O.	148½	6-5	144	- 22	.....	.....	1902	Hard water; also at 66 feet.	623
Dixon Inglis.....	D.	150	7-5½	142	- 75	.....	.....	1904	Soft water.....	624
Bud Greer.....	O.	112	6	100	.....	.....	30	1904	.....	625
.....	C.	291½	.....	.....	.....	.....	.....	1905	(L.).....	626
Ed. Duncan.....	M.	266	.....	.....	.....	.....	.....	1905	(S.).....	627
G. H. Bryant.....	D.	185	6	183	- 15	.....	.....	1900	Hard water.....	628
W. L. Beck.....	D.	140	2	93	- 90	.....	.....	1894	Water, slightly iron and sulphur bearing. (L.)	629
W. H. McWhorter.	C.	1,653	6½	.....	.....	.....	.....	1905	Fresh water at 80 feet; sulphur at 219 feet; small show of oil at 30 feet. (L.)	630
T. Bridges.....	O.	332	6	.....	.....	.....	.....	1905	Well in rock to bottom, but no water.	630a
Quirez & Sparks...	O.	200	5½	150	- 20	.....	.....	1897	Water contains magnesia; town supply.	631
J. B. Dunant.....	D.	780	8½-5½	.....	.....	.....	.....	.....	Show of oil at 450 feet; salt water at 650 feet. (L.)	632
Jesse Burgher.....	O.	110	6	107	- 20	.....	.....	1904	Sulphur water.....	633
.....	M.	255	8	250	-150	.....	10	1903	.....	634
L. Finney.....	O.	245	5½	225	-180	.....	.....	1905	Sulphur water.....	635
James M. Gentry..	D.	120	6½	105	- 60	.....	.....	1904	Water contains iron. (L.)	636

Summary of well drilling

LOUISIANA.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
637	Water..	Bossier.....	Benton, 4 m. E. of....	Raymond.....	
638		Caddo.....	Blanchard, $\frac{1}{4}$ m. S. of....	R. F. Cole.....	
639		do.....	Hosston, 3 m. E. of....	A. R. Thompson & Son.	
640	Water..	do.....	Shreveport.....	Allen Manufacturing Co.	
641	do..	do.....	Shreveport, $\frac{1}{2}$ m. N. of....	Shreveport Ice and Brewing Co.	
642	do..	do.....	Missionary.....	W. B. Means.....	
643	do..	Calcasieu.....	Jennings, 7 m. SW. of, sec. 19, T. 10, R. 3.	A. G. Carr & Son..	
644	do..	do.....	Jennings, 6 m. NW. of, sec. 35, T. 10, R. 4.	E. W. Cooper.....	
645	do..	do.....	Jennings, $3\frac{1}{2}$ m. SW. of, sec. 21, T. 7, R. 3.	P. H. Hoag.....	
646	do..	do.....	Jennings, 1 m. SW. of, sec. 3, T. 10, R. 3.	Arthur Hoag.....	
647	do..	do.....	Jennings, $8\frac{1}{2}$ m. SW. of, sec. 23, T. 10, R. 4.	A. P. Jones.....	
648	do..	do.....	Jennings, $1\frac{1}{2}$ m. S. of....	Dell Marshall.....	
649	do..	do.....	Jennings, 3 m. SW. of, T. 10, R. 3.	H. L. Schultz.....	
650	do..	do.....	Lake Arthur, $4\frac{1}{2}$ m. NW. of, sec. 6, T. 11, R. 6.	G. H. Shove.....	
651	do..	do.....	Lake Arthur, 2 m. NW. of, sec. 9, T. 11, R. 3.	John E. Braden & Son.	A. Brechner.....
652	do..	do.....	Lake Arthur, 2 m. N. of, sec. 9, T. 11, R. 3.	do.....	
653	do..	do.....	Lake Arthur, $3\frac{1}{2}$ m. NW. of, sec. 6, T. 11, R. 3.	R. M. Briggs.....	
654	do..	do.....	Lake Arthur, $1\frac{1}{2}$ m. NW. of, sec. 8, T. 11, R. 3.	R. E. Camp.....	Louisiana Machine and Well Works.
655	do..	do.....	Lake Arthur, 8 m. W. of.	Ney.....	
656	do..	do.....	Lake Arthur, 3 m. SW. of.	Roberta Plantation Co. (Limited).	
657	do..	do.....	do.....	Roberta Plantation	
658	do..	Rapides.....	Alexandria, $\frac{1}{2}$ m. N. of....	City of Alexandria..	Oscar Shanks....
659	do..	do.....	Alexandria.....	Alexandria Cold Storage Co.	do.....
660	do..	do.....	Pineville, 1 m. NE. of....	State of Louisiana..	do.....
661		Red River.....	Lake End, 5 m. S. of....	L. G. Nichols & Son.	
662	Water..	St. Landry.....	Melville, 12 m. S. of....	C. W. Krotz.....	Oscar Shanks....

reported in 1905—Continued.

LOUISIANA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
James Paul Clifford.	D.	180	2½	180	.....	.....	.....	1903	Soft water; kaolin with water at 100 feet.	637
Thos. C. Backus.	D.	219	3-1½	140	.....	.....	.....	.....	Soft, also at 210 feet.	638
J. P. Clifford.	O.	300	3	.....	.....	.....	.....	1904	Soft; well not completed.	639
Thos. C. Backus.	D.	.....	6	.....	.....	.....	14	1904	Soft.	640
J. P. Clifford.	O.	1,000	6-2	1,000	Flows.	1½	.....	1904	Good water at 165 feet; salty at 1,000 feet.	641
Thos. C. Backus.	D.	140	3	.....	do.	.....	.....	1903	.....	642
Chas. Eaton.	O.	300	8	240	- 3	.....	6,000	1902	Hard water; used for rice irrigation.	643
J. F. Ritter.	O.	320	10	200	.....	.....	2,000	1902	Used for irrigating rice.	644
Caffee.	O.	300	9½	210	- 8	.....	1,800	1901	Hard water; used for irrigating rice.	645
O. T. Hanson.	O.	320	10	125	-10	.....	3,000	1904	Used for irrigating rice.	646
J. F. Ritter.	O.	300	10	200	+ 0	.....	.....	1902	do.	647
O. F. Hansen.	O.	335	10	245	-12	.....	.....	1905	Alkaline; some water at 170 feet; rice irrigation.	648
F. B. Coffall.	D.	250	8	100	-10	.....	.....	1901	Sulphuretted; used for rice irrigation.	649
do.	O.	215	10	145	- 4	.....	2,400	1903	Used for irrigating rice.	650
A. Brechner.	O.	370	10	200	- 8	.....	15,000	1905	Soft water; used for irrigating rice. (L.)	651
Louisiana Well Works.	O.	243	10	180	- 8	.....	.....	1901	Soft; rice irrigation.	652
A. Brechner.	O.	365	10	70	- 3	.....	.....	1904	Water hard; used for domestic purposes and rice irrigation.	653
.....	O.	216	8	200	-20	.....	600	1901	Sulphur water; used for irrigating rice.	654
E. P. Fox.	D.	364	.....	284	Flows.	.....	.....	.....	Screen 80 feet long. (L.)	655
do.	D.	364	12	200	.0	.....	2,000	1902	Used for domestic purposes and rice irrigation; 4 other wells 220 to 260 feet deep.	656
do.	D.	220	9½	.....	- 2	.....	.....	1902	4 wells; soft water at 140 to 220 feet; rice irrigation. (L.)	657
Oscar Shanks.	C.	726	6	726	-40	.....	416	1905	Water soft; city supply for all purposes.	658
B. Weisel.	C.	1,020	.....	.....	.....	.....	.....	.....	(S.)	659
Oscar Shanks.	C.	900	6	900	-40	.....	111	1905	Soft water; supplies State militia encampment. (L.)	660
J. P. Clifford.	O.	240	5-4	240	- 9	.....	250	.....	Water at 175 feet; main supply; soft.	661
Oscar Shanks.	M.	2,180	10-4	1,660	+48	.....	.....	.....	.....	662

Summary of well drilling

LOUISIANA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
663	Water..	Webster.....	Cotton Valley, 1 m. N. of.	Porter Wadley Lumber Co.	.....
664	....do....	....do.....	Minden, $\frac{1}{2}$ m. SW. of...	Minden water-works.	L. B. Clifford Well Co.

MAINE.

665	Water..	Cumberland.....	Westbrook, 1 m. W. of.	J. Henry Rines.....	.....
a 666	....do....	....do.....	Fort Levett, 3 m. SE. of Portland.	United States.....	G. W. Patterson..
667	....do....	....do.....	Peaks Island, SE. of Portland.	.....	L. A. Reed & Son..
668	Oil.....	Franklin.....	Carthage, Cottage Farm, Well No. 1.	William Wade.....	A. S. Merrill.....
669	Water..	Kennebec.....	Winthrop.....	Frank S. Wood.....	Artesian Well and Supply Co.
670	....do....	Lincoln.....	Damariscotta, 12 m. SE. of.	A. E. Poland.....	A. E. Poland.....
671	....do....	Knox.....	North Haven Village, 7 m. N. of.	Lewis Herzog.....	C. E. Shute.....
672	....do....	....do.....	South Ows Head, High Island.	W. Gray & Sons.....	.....
673	....do....	York.....	Bar Mills, 1 m. E. of...	Geo. G. Paige Box Co.	.....

MARYLAND.

a 674	Water..	Anne Arundel...	Annapolis, United States Naval Academy.	United States.....	J. H. K. Shannahan Well Co.
675	....do....	Baltimore.....	Baltimore, foot of Block street.	Hammond Ice Co...	Downin & Co....
676	....do....	....do.....	Baltimore.....	Stafford Hotel.....	F. P. Rust.....
677	....do....	....do.....	Baltimore, Lombard and Eighth streets.	W e i s k e t t l e foundry.	Downin & Co....
678	....do....	....do.....	Claremont.....	Davidson Chemical Co.	....do.....
679	....do....	....do.....	....do.....	....do.....	....do.....
680	....do....	....do.....	Glyndon.....	W. G. Atkinson.....	Crest & Son.....
681	....do....	....do.....	Lutherville.....	Edwin T. Hambleton.	Downin & Co....
682	....do....	....do.....	Northpoint.....	United Railways and Electric Co.	.....
683	....do....	....do.....	Sollers Station.....	....do.....	Downin & Co....
684	....do....	Prince George..	Hyattsville, $\frac{1}{4}$ m. E. of...	Town of Hyattsville	J. H. K. Shannahan Artesian Well Co.
685	....do....	....do.....	....do.....	....do.....	....do.....
686	Oil.....	....do.....	Meadows, well No. 2...	Maryland Oil and Development Co.	.....
a 687	Water..	St. Mary.....	Chaptico.....	A. C. Welch.....	Lawrence Rude...

a See detailed record at end of table.

reported in 1905—Continued.

LOUISIANA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
L. B. Clifford Well Co.	D.	400	6-4	300	-48	.....	67	1905	Water at 120-132 and 300-400 feet; soft.	663
.....do.....	C.	777	8	80	- 8	.....	192.5	1904	No water below 316 feet; show of oil at 550 feet. (L.)	664

MAINE.

Walter Dockendorf	D.	300	6	300	-40	.....	2	1900	Hard water. (L.)....	665
G. W. Carman.....	M.	320	8-6	.....	.....	.....	33.9	1905	Temperature 49°. (L. S.)	666
L. A. Reed & Son ..	C.	203	8	.....	.....	.....	70	1905	(L.).....	667
C. E. Shute.....	D.	270	6	.....	-14	.....	4	1905	Water from below 45 feet. (L. S.)	668
Frank Mentzer	D.	176	8	.....	.....	.....	4	1905	(L. S.).....	669
H. M. Poland.....	D.	118½	6	117	- 6	.....	5	1905	Water at 28 feet. (L. S.)	670
C. E. Shute.....	C.	164	6	80	-15	.....	3½	1905	(L. S.).....	671
O. W. Poland	D.	230	6	.....	.....	.....	.....	1905	(S.).....	672
W. H. Drysdale....	M.	150	6	150	-20	.....	40	1897	Soft water.....	673

MARYLAND.

N. M. Shannahan..	D.	601	12-8	586	+ 8	75	.....	1905	Water iron bearing. (L. S.)	674
Downin & Co.....	C.	100	6	100	.....	.....	.....	1903	(L. S.).....	675
F. H. Goddard	D.	315	8	.....	.....	.....	15	1905	(L. S.).....	676
Downin & Co.....	C.	265	6	263	.....	.....	.....	1903	(L. S.).....	677
.....do.....	C.	90	6	.....	.....	.....	75	1903	(L. S.).....	678
.....do.....	C.	139	6	.....	.....	.....	75	1905	(L. S.).....	679
Crest & Son	C.	215	4	60	.....	.....	.....	1903	(L.).....	680
Downin & Co.....	C.	125	6	120	-15	.....	70	1905	(L. S.).....	681
Shannahan Well Co.	O.	339½	8-6	318	- 6	.....	66	1905	Water at 240-244 feet. (L.)	682
Downin & Co.....	C.	287	6	287	-16	.....	50	1903	(L. S.).....	683
N. M. Shannahan..	M.	108	6	105	+ 5	6	24	1905	2 wells; water soft, iron bearing; part of town supply.	684
.....do.....	D.	240	6	190	+15	20	44	1905	Water iron bearing; part of town supply. (L.)	685
.....do.....	O.	1,511	.....	.....	.....	.....	.....	1905	Show of gas; no oil in paying amount. (S.)	686
Roland Rude.....	C.	295	1½-1	270	+22	7	.....	1905	(L. S.).....	687

b Barrels a day.

*Summary of well drilling***MARYLAND—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
688	Water..	St. Mary	Maddox, 2 m. W. of ...	Mrs. B. Garner.....	Lawrence Rude...
^a 689	...do...	Talbot.....	Tilghman.....	E. N. Lomax.....	...do.....
690	...do...	Washington.....	Blue Ridge Summit, Pa., 1 m. S. of.	Dr. Joseph Roach...	.....
691	...do...	Worcester.....	Pocomoke City.....	W. J. Young.....	W. J. Young

MASSACHUSETTS.

692	Water..	Barnstable.....	Provincetown.....	Provincetown Water Co.	Artesian Well and Supply Co.
693	...do...	Berkshire.....	North Adams, 1 m. S. of.	City of North Adams.	.....
694	...do...	...do.....	Sheffield, 3 m. N. of...	Berkshire Hills Co..	F. Champlin.....
695	...do...	Essex.....	Lawrence, $\frac{1}{2}$ m. SE. of...	Emerson Manu- facturing Co.	D. M. Pott & Co ..
696	...do...	...do.....	Peabody, $\frac{1}{3}$ m. NE. of...	National Calfskin Co.	Artesian Well and Supply Co.
697	...do...	...do.....	Lynn.....	Lovers Leap Spring Water Co.	.....
698	...do...	Hampden.....	East Longmeadow.....	Congregational Church.	F. A. Champlin...
699	...do...	...do.....	...do.....	O. C. Hunn.....	...do.....
700	...do...	...do.....	Holyoke.....	Farr Alapaca.....	...do.....
701	...do...	...do.....	Springfield, 2 m. E. of...	City of Springfield..	...do.....
^a 702	...do...	Hampshire.....	S. Hadley Center.....	L. P. Alvord.....	...do.....
703	...do...	...do.....	S. Hadley Center, 3 m. N. of.	H. F. Metcalfe.....	...do.....
704	...do...	...do.....	Belchertown.....	Myron P. Walker...	.....
705	...do...	Middlesex.....	Oakville, $\frac{1}{4}$ m. W. of...	Dwight Atwood ...	F. A. Champlin...
706	...do...	Plymouth.....	Bridgewater.....	Bridgewater Water Co.	B. F. Smith & Bro.
707	...do...	Worcester.....	Worcester, 484 Main street.	Denholm & McKay Co.	H. M. Tompkins..

MICHIGAN.

708	Water..	Barry.....	Nashville, $1\frac{1}{2}$ m. W. of, sec. 34, T. 3, R. 7.	W. A. Smith.....	J. C. Haring.....
709	...do...	Berrien.....	Eau Claire.....	Andrew Porter.....	.....
710	...do...	...do.....	St. Joseph.....	Vincent & Blake ..	.....
711	...do...	Ingham.....	Michigan Agricultural College.	State of Michigan...	Packard & Ed- gerton.
712	...do...	Leelanau.....	Burdickville, $\frac{1}{2}$ m. SE. of	Joseph Price.....	.....
713	...do...	...do.....	Omena, $\frac{1}{4}$ m. S. of, sec. 35, T. 31, R. 11.	Francis H. Cloud...	.....
714	Water..	Menominee.....	Menominee, $1\frac{1}{2}$ m. NW. of.	Menominee Brick Co.

^a See detailed record at end of table.

SUMMARY OF DRILLING.

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reported in 1905—Continued.

MARYLAND—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Roland Rude.....	C.	275	1½	248	.....	6	.....	1905	(L. S.).....	688
R. L. Rude and E. C. Jones.	C.	380	1½	380	.....	.....	10	1905	Water stratum 60 feet thick. (L. S.)	689
George Zink.....	O.	324	6	.....	-97	.....	.....	1905	(S.).....	690
.....	.....	105	2	97	.....	.....	.....	1895	Abundance of water. (L. S.)	691

MASSACHUSETTS.

M. F. Knauf.....	D.	300	.....	.....	.....	.....	.....	1905	(S.).....	692
.....	M.	600	8	600	- 5	.....	694	1884	Hard water; city supply; 2 wells used in dry seasons.	693
James Egan.....	D.	100	6	.....	.....	.....	.....	1905	(L. S.).....	694
.....	O.	200+	6	.....	.....	.....	40	.....	Hard, salty. (L.)	695
Artesian Well and Supply Co.	O.	551	8	.....	.....	.....	17	1905	No water to 530 feet; not used. (L.)	696
.....	M.	157	6	130	.....	.....	.....	1905	Small supply of good quality.	697
James Egan.....	D.	103	6	100	.....	.....	38	1905	Water at 25-50 feet. (L.)	698
.....do.....	D.	233	6	.....	.....	.....	15	1905	Water at 50-75 feet, and 200-233 feet. (L.)	699
.....do.....	D.	352	8	245	.....	.....	40	1905	Water at 80-100 feet. (L.)	700
.....do.....	D.	127	6	126	-35	.....	18	1905	Soft water. (L.)	701
Ernest Lyon.....	.....	714	6	100	-60	.....	40	1905	(L. S.)	702
E. L. Lyon.....	D.	262	6	260	- 3	.....	15	1905	(L. S.)	703
W. B. Shaw.....	M.	249	6	.....	-10	.....	.....	1888	.....	704
Ernest Lyon.....	D.	100	6	.....	-16	.....	5	1905	Soft water. (L. S.)	705
.....	O.	200	.....	.....	-20	.....	.....	.....	Contains iron; 11 wells.	706
H. M. Tompkins...	O.	500	6	400	-20	.....	12	1905	Hard water.	707

MICHIGAN.

Theodore Updegraff.	O.	274	1½	.....	Flows.	.....	.....	1905	Hard; flow began at 60 feet. (L.)	708
H. C. Kurtts.....	.....	140	.....	.....	.....	.....	.....	1905	(S.)	709
Cartwright and Sherry.	O.	820	8	820	.....	.....	.....	1905	"Inexhaustible supply." (S.)	710
Packard & Edgerton.	D.	295	6	.....	.....	.....	.....	1905	(L. S.)	711
Steve Burk.....	M.	180	2	120	-100	.....	.....	1898	Hard water.	712
Fred Light.....	O.	291	4-2	168	.....	.....	.....	.....	.....	713
James Lucas.....	O.	227	4	165	.....	½	4	1905	Hard, alkaline water. (L.)	714

*Summary of well drilling***MICHIGAN—Continued.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
715	Oil.....	Washtenaw.....	Manchester, 6 m. SE. of.	Manchester Oil Co..	
716	do.....	Wayne.....	Dearborn, $\frac{3}{4}$ m. NW. of.	Dr. T. V. Law (Wayne County Oil and Gas Co.).	J. C. Potter
717	Water.....	Wexford.....	Boon, $1\frac{1}{2}$ m. SE. of, sec. 26.	Gorham Bros.....	
718	do.....	do.....	Selma, $4\frac{1}{2}$ m. NE. of.	O. B. Zeitz.....	

MINNESOTA.

719	Water..	Carver.....	Norwood.....	L. Zellman.....	
720	do.....	Chisago.....	Center City, 7 m. S. of.	Frank Stromquist..	A. C. Holm.....
721	do.....	do.....	Center City, 7 m. N. of.	John Mohn.....	A. B. Holm.....
722	do.....	Goodhue.....	Zumbrota.....	Village of Zumbrota	
a 723	do.....	Hennepin.....	South Minneapolis.....	Chicago, Milwaukee and St. Paul Rwy.	
724	do.....	Houston.....	Caledonia.....	do.....	
725	do.....	Kittson.....	Kennedy, near post- office.	Village of Kennedy.	
726	do.....	do.....	Kennedy, $\frac{1}{2}$ m. NE. of.	do.....	
a 727	do.....	Ottertail.....	Fergus Falls, sec. 27, T. 133, R. 43.	State of Minnesota.	J. F. McCarthy...
a 728	do.....	Pine.....	Groningen.....	Northern Pacific Rwy.	St. Paul Artesian Well Co.
729	do.....	Ramsey.....	St. Paul.....	A. Booth Packing Co.	do.....
730	do.....	do.....	do.....	Northern Pacific Rwy.	J. F. McCarthy...
731	do.....	do.....	do.....	St. Joseph's Hospital	St. Paul Artesian Well Co.

MISSISSIPPI.

732	Water..	Clay.....	West Point, $\frac{1}{2}$ m. N. of.	Mississippi Cotton Oil Co.	
733	do.....	Covington.....	Collins.....	City of Williams- burg.	
734	do.....	do.....	Mount Olive, sec. 7, T. 9, R. 17.	Town of Mount Olive.	
a 735	do.....	Hancock.....	Bay St. Louis, $1\frac{1}{4}$ m. SW. of.	Charles Sanger.....	John A. Sutter...
736	do.....	do.....	Bay St. Louis, $\frac{1}{4}$ m. N. of.	do.....	
737	do.....	do.....	Bay St. Louis, $\frac{1}{2}$ m. W. of.	do.....	J. A. Sutter.....
738	do.....	do.....	Bay St. Louis, $\frac{3}{4}$ m. N. of.	do.....	do.....
739	do.....	Harrison.....	Biloxi.....	City of Biloxi.....	A. B. Blakemore..

a See detailed record at end of table.

reported in 1905—Continued.

MICHIGAN—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
C. A. Elliott.....	D.	690	.....	.....	.....	.....	.....	1905	(S.)	715
J. Stearns and J. Tobin.	O.	280	8	280	+ 35	10,000	.....	1905	Hard, sulphur, "alkaline laxative" water; sulphur water at 175 feet. (L.)	716
L. H. Maule.....	D.	106	2	87	- 87	.....	20	1905	(S.)	717
Lewis Maule.....	D.	232	2	225	.....	.....	.....	1905	Hard water at 93 feet. (L. S.)	718

MINNESOTA.

Jos. Braunworth..	D.	300	.....	.....	.....	.....	.....	1905	(S.)	719
C. T. Stendahl..	C.	112	4	94	- 94	.....	.....	1905	Hard water. (L. S.)	720
.....do.....	C.	146	4	146	-128	.....	10	1905	(L.)	721
W. S. Collinge..	D.	210	12-10	.....	- 26	.....	150	1897	Hard water	722
.....	O.	704	.....	.....	.....	.....	.....	.....	(L.)	723
.....	O.	310	6	.....	-270	.....	.....	1905	(L.)	724
J. L. Gardner..	D.	175	3-2	165	Flows.	.....	.....	1905	Slightly alkaline water.	725
.....do.....	D.	333	.....	325	+ 12	18	.....	1903	Salty. (L.)	726
John Shogren..	D.	422	10-8	400	- 97	.....	100	1905	(L. S.)	727
A. J. Carey.....	D.	320	8	300	- 22	.....	260	1904	(L. S.)	728
.....do.....	D.	315	6	.....	.....	550	.....	1905	Water from 145-146, 240-256, 300-315 feet. (S. L.)	729
E. Christofferson..	D.	227	10-8	186	+ 9	450	.....	1905	Water at 155-162 and 163-179 feet. (L. S.)	730
A. J. Carey.....	D.	827	6-6	795	- 54	.....	500	1905	(L. S.)	731

MISSISSIPPI.

Saml. Kaye.....	D.	700	4-3	680	+ 7	22	.....	1905	Soft; contains iron ...	732
W. C. Porter.....	D.	190	8	120	- 21	.....	146	1905	(L.)	733
.....do.....	D.	186	8	170	+ 8	17	52	1905	Hard; town supply ..	734
John L. Ford.....	D.	920	4	805	Flows.	400	.....	1905	Water at 500-565 and 805-920 feet. (L. S.)	735
John A. Sutter ..	O.	980	4	.....	+ 60	225	.....	1905	Soft; iron and sulphur bearing; temperature, 78°.	736
J. Ford	O.	960	4	.....	+ 60	340	.....	1905	Soft	737
John L. Ford.....	D.	910	4	880	.....	250	.....	1905	Water from 380-520 and 840-910 feet; first not used. (L. S.)	738
.....	M.	900	8	.....	+ 30	800	.....	1904	Soft; part of city supply.	739

*Summary of well drilling***MISSISSIPPI**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
740	Water..	Harrison	Biloxi	D. J. Gray and C. B. Elarbee.	A. B. Blakemore..
741	...do...	...do.....	Gulfport, 2½ m. NE. of..	McAlin.....	John A. Sutter...
742	...do...	...do.....	Mississippi City, 3 m. W. of.	J. A. Potter.....	...do.....
743	...do...	...do.....	Pass Christian, ½ m. W. of.	Pass Christian Artesian Water Co.	...do.....
744	...do...	Hinds.....	Jackson, 1 m. SE. of, T. 5, R. 1.	City of Jackson....	.....
745	...do...	Jackson.....	Vanceleave.....	L. N. Dantzler Lumber Co.	John A. Sutter...
746	...do...	Jones.....	Ellisville, 1 m. S. of, sec. 4, T. 7, R. 12.	Town of Ellisville...	W. C. Porter.....
747	...do...	...do.....	Ellisville, 2 m. SW. of, sec. 8, T. 7, R. 12.	Ellisville Lumber Co.	.....
748	...do...	Marshall.....	Holly Springs.....	Holly Springs Light and Water Co.	Johnston & Fleming.
749	...do...	Newton.....	Newton, ¼ m. W. of, sec. 34, T. 6, R. 11.	Newton Oil and Manufacturing Co.	P. J. Doyle.....
750	...do...	Panola.....	Sardis, 600 feet SW. of, Illinois Central R. R. depot.	Illinois Central R. R.	.....
751	...do...	Sunflower.....	Indianola, sec. 31, T. 19, R. 4.	Town of Indianola.	.....
752	...do...	Union.....	New Albany.....	Mobile, Jackson and Kansas City R. R.	Johnston & Fleming.

MISSOURI.

753	Water..	Audrain.....	Clark, 5½ m. NE. of....	Geo. E. Ess.....	Johnston Bros ..
754	...do...	...do.....	Ladsonia, 3 m. S. of, sec. 14, T. 51, R. 7.	W. T. Hughlett ..	.....
755	...do...	...do.....	Mexico.....	.....	.....
756	Water..	...do.....	Mexico, 5 m. N. of....	Earl Carter.....	W. E. Smith.....
757	...do...	...do.....	Mexico, 1 m. N. of....	James Johnston....	...do.....
758	...do...	...do.....	Mexico, 2 m. E. of, sec. 30, T. 51, R. 8.	Lawder estate.....	.....
759	...do...	...do.....	Vandalia, 8 m. N. of....	O. L. Fuque.....	G. W. Calvert....
760	...do...	...do.....	...do.....	J. K. Moore.....	.....
761	...do...	Barry.....	Eaglerock, ¾ m. NE. of, sec. 4, T. 21, R. 26.	Eliza Shelton.....	.....
762	...do...	...do.....	Exeter, near post-office.	St. Louis and San Francisco R. R.	J. C. Laird.....
763	...do...	...do.....	Jenkins, 1½ m. NW. of, sec. 14, T. 24, R. 26.	H. O. Cornman....	.....
764	...do...	...do.....	Jenkins, 5 m. NW. of...	V. Mullins.....	L. T. Suttles
765	...do...	...do.....	Jenkins, 2½ m. NW. of..	W. W. Suttles.....	.....
766	...do...	...do.....	Leavin, 1 m. N. of....	Gilmore.....	.....
767	Water..	...do.....	Leann, 1½ m. SW. of...	N. A. L. Thomas...	.....

a See detailed record at end of table.

reported in 1905—Continued.

MISSISSIPPI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	O.	740	4	.....	Flows.	400	.....	1905	Soft water; flows at +35 feet.	740
John L. Ford.....	D.	825	3	750	+ 50	140	.....	1905	Water stratum 160-220 feet; not flowing at this depth. (L. S.)	741
.....do.....	D.	705	3	600	+ 85	225	.....	1905	Water at 145-156 and 234-257 feet. (L. S.)	742
.....do.....	D.	901	4	829	+ 70	400	.....	1905	Water sand at 345-387 and 829-901 feet. (L. S.)	743
A. K. Wallen.....	M.	1,205	4½-3	1,200	+ 50	100	.....	1905	Salty, alkaline; not used; temperature, 32° C.; water sand at 750 feet.	744
John L. Ford.....	D.	747	3	727	Flows.	125	.....	1905	Water at 250-295 and 689-747 feet. (L. S.)	745
W. C. Porter.....	C.	694	6-4	540	.....	.....	174	1904	(L.).....	746
.....do.....	D.	288	6	258	- 21	.....	.....	1905	Water at 100 feet. (L. S.)	747
A. Goldsberry.....	D.	349	8	306	-174	.....	200	1905	(L. S.).....	748
P. J. Doyle.....	C.	842	8-6	812	- 70	.....	100	1905	(L.).....	749
Geo. Bailey.....	M.	210	10	170	.....	.....	150	1905	(L. S.).....	750
T. C. Garrott.....	M.	1,350	4	.....	+ 60	.....	225	1905	Soft, alkaline. (L.)..	751
A. Goldsberry.....	D.	225	8	217	.....	.....	125	1905	(L.).....	752

MISSOURI.

Johnston Bros.....	O.	216	5½	190	.....	.....	.....	1901	Soft water.....	753
D. F. Palmer.....	O.	150	4	100	- 50	.....	2	1902	Hard water.....	754
W. E. Smith.....	D.	480	.....	.....	.....	.....	.....	1905	(L. S.).....	755
.....do.....	C.	410	5½	400	- 80	.....	5	1905	Water at 220 feet; water from well is hard. (L.)	756
.....do.....	C.	227	5½	190	- 50	.....	2	1905	Hard. (L. S.).....	757
R. J. Lawder.....	D.	320	8-5	265	-150	.....	.....	1902	Hard water; also at 204 feet. (L.)	758
W. D. McDonald..	D.	306	6	280	-106	.....	.....	1905	(L.).....	759
.....do.....	D.	290	.....	290	- 90	.....	.....	1904	.....	760
J. W. Bullington..	D.	145	5½-1½	120	-120	.....	.....	.....	.....	761
E. T. Stanly.....	D.	869	13-10	825	-220	.....	.....	1903	Soft sulphur water....	762
L. T. Suttles.....	D.	120	6	60	.....	.....	.....	1897	Hard water.....	763
.....do.....	C.	150	6	.....	.....	.....	.....	1897	Sulphur water.....	764
.....do.....	D.	212	6	70	- 60	.....	.....	1901	.....	765
.....do.....	D.	150	6	80	- 60	.....	.....	.....	Hard water.....	766
.....do.....	D.	116	6	80	- 50	.....	.....	.....	.....do.....	767

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
768	Water	Barry	Oca, 1 m. S. of	Robert Wilson	L. T. Suttles
769		do	Schollen, near post-office	A. Whittier	
770	Water	Benton	Cole Camp, $1\frac{1}{2}$ m. NE. of, sec. 30, T. 40, R. 20.	Henry Trangott, sr.	
771	do	Bollinger	Alliance, 1 m. N. of, sec. 12, T. 33, R. 9.	Henry F. Johnson	
772		do	Bessville, $1\frac{1}{2}$ m. N. of, sec. 7, T. 31, R. 9.	Johnson Yount	
773	Water	do	Marble Hill, $\frac{1}{2}$ m. N. of, sec. 5, T. 30, R. 10.	J. V. Slinkard	
774	do	do	Marble Hill, near post-office, sec. 5, T. 30, R. 10.	F. M. Wells	
775	do	do	Patton, 5 m. S. of	C. A. Hahn	
776	do	Boone	Columbia, 2 m. NE. of	City of Columbia	R. W. Berry
777	do	do	Columbia, 5 m. S. of, sec. 3, T. 47, R. 13.	Nat. Dodd	
778	do	do	Pierpont, sec. 8, T. 47, R. 12.	J. A. Gilbert	
779	do	do	Sapp, 3 m. NW. of	John E. Crane	
780	Oil	Callaway	Cedar City, $7\frac{1}{2}$ m. NE. of	George Carlton	
781	Water	do	Fulton, $\frac{1}{2}$ m. NE. of post-office.	City of Fulton	
782	do	do	McCredie, $\frac{1}{2}$ m. SW. of, sec. 8, T. 48, R. 19.	Crawford	
783	do	do	McCredie, $\frac{1}{2}$ m. SE. of, sec. 10, T. 48, R. 19.	Harrison	
784	do	Camden	Damsel, 5 m. SE. of, sec. 15, T. 38, R. 16.	Wm. Byrd	W. T. Salsman
785	do	do	Damsel, 5 m. SE. of	Genesee Mining and Milling Co.	
786	do	do	Damsel, 4 m. SE. of, sec. 15, T. 38, R. 16.	Charley Ritter	W. T. Salsman
787		do	Hahatonka, $1\frac{1}{2}$ m. NW. of, sec. 2, T. 37, R. 17.	R. M. Snyder	
788		do	Hahatonka, 1 m. W. of, sec. 3, T. 37, R. 17.	Heirs of W. H. Webster	
789		do	Hahatonka, $1\frac{1}{2}$ m. SW. of, sec. 10, T. 37, R. 17.	do	
790		do	Montreal, $\frac{3}{4}$ m. N. of, sec. 5, T. 37, R. 15.	W. D. Elliott	
791	Water	do	Passover, 1 m. SE. of	James Degraffenreid	
792	do	do	Spring Valley, $1\frac{1}{2}$ m. NW. of	Forest Ropp	
793	do	Cape Girardeau	Daisy, $1\frac{1}{2}$ m. W. of	Marshall Wills	
794		Carroll	Bosworth, W. of	Sal Watt	
795	Oil	do	Braymer, 5 m. SE. of	Thomas Winterrode	
796	Water	Carter	Grandin, 17 m. NW. of, sec. 18, T. 27, R. 2.	Missouri Lumber and Mining Co.	Bailey & Vaughn
797	do	do	Grandin	Levi Shinn	
798	do	do	Grandin, 6 m. NE. of	Ben Zerdon	

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
L. T. Suttles.....	C.	105	6	50	.....	.....	.....	1902	.....	768
.....do.....	D.	130	6	120	.....	.....	.....	.....	(L.).....	769
Henry Trangott, sr.	O.	127	6	80	- 80	.....	.....	1905	Hard water; also at 75 feet.	770
Christian Hahs....	M.	159	6	159	- 80	25	5	1905	Water at 80 and 152 feet; hard. (L.)	771
Bollinger County Mining Co.	M.	400	3	250	+ 10	.....	.....	1903	Slightly sulphurous..	772
Fred Hahs	D.	102	6	95	- 49	.....	5	1903	Hard water.....	773
.....do.....	O.	101	6	91	- 40	.....	.....	1903	.....do.....	774
C. A. Hahn.....	O.	162	6	150	-130	.....	.....	1905	Hard water; also at 100, 120, and 125 feet.	775
Cliff Rummons....	C.	800	5½	760	.....	.....	250	1905	Water-bearing strata at 80-120, 410-450, 500-525 feet.	776
James Pruett.....	O.	102	6	90	- 50	.....	.....	1898	Water hard.....	777
.....do.....	D.	151	6	120	- 60	.....	.....	1901	Hard water.....	778
.....do.....	D.	138	6	.....	- 30	.....	.....	1905	Hard water at 40, 60, and 100 feet.	779
.....do.....	M.	1,300	.....	.....	Flows.	.....	.....	1903	No oil.....	780
.....do.....	M.	700	12-9	520	-250	.....	3,500	.....	Hard water; public supply.	781
.....do.....	M.	115	7	115	.....	.....	.....	1904	Soft water.....	782
.....do.....	M.	130	7	130	.....	.....	.....	1904	.....do.....	783
W. T. Salsman....	C.	116	6	107	.....	.....	.....	1905	Seep at 79 feet. (L. S.)	784
.....do.....	M.	164	6	.....	.....	.....	.....	1905	(L. S.).....	785
W. T. Salsman....	C.	100	6½	95	- 80	.....	2	1905	Seep at 50 feet. (L. S.)	786
W. Graham	M.	864	2-1½	800	+ 40	.....	.....	1902	Sulphur water; water at 60 and 300 feet. "Kellogg well."	787
W. H. Rush.....	M.	670	2-1½	600	+ 5	.....	.....	1899	Hard water; water at 90 feet. "Scott well."	788
.....do.....	M.	730	2-1½	700	+ 20	.....	.....	1899	Hard water. "Webster well."	789
A. Leitch.....	M.	110	6	.....	.....	.....	.....	.....	Dry hole.....	790
W. T. Salsman....	D.	107	6	70	.....	.....	.....	1905	(L.).....	791
W. J. Thomas.....	D.	148	6	140	-136	.....	20	1900	.....	792
C. F. Hahs.....	D.	130	5½	120	75	.....	.....	1901	Hard water. (L.)....	793
G. B. Young.....	D.	265	6	160	- 65	.....	.....	.....	Soft water; also at 250 feet.	794
J. E. Dempsey.....	D.	1,100	6-5	500	-120	.....	.....	1902	Salty water. (L.)....	795
C. H. Bailly.....	C.	445	13-10	.....	-250	.....	30	1905	Water from seams in rock at 250 feet and below. (L. S.)	796
Levi Shinn.....	O.	125	6	.....	.....	.....	.....	1900	(L.).....	797
.....do.....	D.	136	6	130	- 20	.....	.....	1902	Soft water.....	798

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
799	Water..	Cedar.....	Fillee, $4\frac{1}{2}$ m. NE. of, sec. 33, T. 35, R. 27.	Lewis and R. W. Tunnell.	.....
800	....do....	Chariton.....	Indian Grove, $1\frac{1}{2}$ m. SE. of.	George Clavins.....	.....
801	....do....	....do.....	Indian Grove, 1 m. N. $\frac{1}{2}$ E. of.	Jurgen R. Howeden.	M. Dearmin.....
802	....do....	....do.....	Keytesville, $\frac{1}{4}$ m. W. of.	Chas. Thrash.....	.....
803	....do....	....do.....	Mendon, 6 m. SE. of.	Fletcher.....	M. Dearmin.....
804	....do....	....do.....	Mendon, 5 m. SE. of, sec. 2, T. 54, R. 20.	Christ. Fritz.....	....do.....
805	....do....	....do.....	Rockford, 2 m. N. of.	Perry Haines.....	....do.....
806	Water..	....do.....	Salisbury, near post-office.	City of Salisbury...	.....
807	....do....	....do.....	Shannondale, 2 m. E. of.	Sam Spencer.....	M. Dearmin.....
808	....do....	....do.....	Triplett, $1\frac{1}{2}$ m. E. of.	Robert Morehead.....	....do.....
809	....do....	Clark.....	St. Francisville, $\frac{1}{4}$ m. SW. of.	Samuel Bates.....	Haggerty & Skog.
810	....do....	....do.....	Wayland, 2 m. NW. of.	Mrs. Martha E. Flowers.	....do.....
811	....do....	....do.....	Wayland, $1\frac{1}{2}$ m. N. of.	John Murphy.....	....do.....
812	....do....	....do.....	Wayland, 1 m. NE. of.	Thos. Spurgeon.....	....do.....
813	....do....	Cole.....	Centertown, 4 m. NE. of, sec. 10, T. 45, R. 13.	S. T. Blackburn.....	C. H. Mohr.....
814	....do....	....do.....	Centertown, $\frac{1}{2}$ m. S. of.	D. Brackett.....	Wm. Urban.....
815	....do....	....do.....	Centertown, 4 m. NE. of, sec. 10, T. 45, R. 13.	J. Groves.....	Jas. W. Robb.....
816	....do....	....do.....	Centertown, near post-office.	Missouri Pacific R. R.	.....
817	....do....	....do.....	Jefferson City, $\frac{1}{4}$ m. W. of.	Dulle Milling Co.....	.....
818	....do....	....do.....	Jefferson City.....	Jefferson City Gas Co.	.....
819	....do....	....do.....	....do.....	John Schott.....	.....
820	Water..	Cooper.....	Boonville, $6\frac{1}{2}$ m. E. of.	P. C. Nuckles.....	.....
821	....do....	Crawford.....	Bourbon, 2 m. NW. of.	Reddick.....	.....
823	....do....	Dent.....	Hobson, 10 m. NW. of.	Hobson & Co.....	C. C. Gower.....
824	....do....	....do.....	Salem, 4 m. SW. of, sec. 3, T. 33, R. 6.	Warren Bertrand.....	....do.....
825	....do....	....do.....	Salem, 6 m. S. of, sec. 18, T. 33, R. 5.	Geo. Bullock.....	John Zirjack.....
826	....do....	....do.....	Salem, $2\frac{1}{2}$ m. S. of, sec. 36, T. 34, R. 6.	D. S. Love.....	C. C. Gower.....
827	Water..	Franklin.....	Luebbering, near post-office, sec. 29, T. 41, R. 2.	F. A. Pilliod.....	Lawson Wideman
828	....do....	Grundy.....	Trenton, 3 m. NE. of, sec. 3, T. 61, R. 24.	Mrs. L. T. Songer.....	.....
829	....do....	Hamilton.....	Star, 5 m. NE. of.	J. Smith.....	.....
830	....do....	Harrison.....	Bethany, $1\frac{1}{2}$ m. NW. of.	D. M. Hollar.....	.....
831	....do....	....do.....	Bethany, 5 m. SW. of, sec. 32, T. 63, R. 28.	S. L. Maize.....	.....
832	....do....	....do.....	Bethany, 2 m. NE. of.	William Rodgers.....	.....

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth. °	Diameter.	Depth to prin- cipal water or oil supply.	Height of water.	Yield per minute.		Year com- plet- ed.	Remarks.	No.
						Flow.	Pump.			
Lewis and R. W. Tunnell.	O.	140	6	140	— 37			1905	Hard water.....	799
M. Dearmin.....	D.	170	6-5	150	— 56		3	1905	Soft water. (L. S.) ..	800
.....do.....	C.	226	6-5					1905	2 barrels at 200 feet. (S.)	801
.....do.....	D.	218	4½	100				1896	Salty water. (L.)....	802
.....do.....	C.	267	5-4	257				1905	Brackish. (L.)	803
.....do.....	C.	126	6-5			3		1905	(L. S.).....	804
.....do.....	C.	170	5				3	1905	Soft water. (L. S.)..	805
A. Edmonson.....	D.	150	6½-5½	150	— 40			1896	Soft water; also at 75 feet. (L.)	806
M. Dearmin.....	C.	310	5	295			4	1905	Slightly salty. (L.)..	807
.....do.....	C.	126	5				3	1905	(L.).....	808
T. J. Haggerty.....	C.	164	6	159	— 40		10	1905	Soft water. (L.).....	809
.....do.....	C.	119	6	159	— 40		10	1905	.....do.....	810
.....do.....	C.	294	6	187	— 148		7	1905	.....do.....	811
.....do.....	C.	300	6	212	— 130		5	1905	.....do.....	812
W. P. Harrison.....	C.	100	6	74			4	1905	(L. S.).....	813
Jas. W. Robb.....	D.	100	6	93	— 70		½	1905	Little water at 35-65 feet. (L. S.)	814
.....do.....	C.	100	6	74			4	1905	(L. S.).....	815
.....do.....	D.	100	6	63			1	1904	Hard water; also at 87 feet.	816
Marrs & Miller.....	M.	280			Flows.					817
Jas. W. Robb.....	D.	220	120-6	215	— 8				Soft water. (L.).....	818
.....do.....	M.	1,365			— 40				Hard water near sur- face; soft water near 300 feet; used as a public well.	819
S. H. Edson.....	D.	160	6	145	— 90		3	1905	Hard water at 65 feet. (L.)	820
Albert Maier.....	D.	180	6	160	— 160			1901	Hard water.....	821
C. C. Gower and T. Jackson.	C.	165	6	158	— 118		6	1905	(L. S.).....	823
C. C. Gower.....	D.	160	6	150	— 135			1904	Hard water. (L.)....	824
.....do.....	D.	157	5½	135	120			1904	Hard water; water at 95 feet also. (L.)	825
.....do.....	C.	175	6				5	1905	(L. S.).....	826
Lawson Wideman.	D.	150	6	140	— 50		5	1902	Hard water; water at 130 feet. (L.)	827
J. Smith.....	M.	120	8	118	— 100		3	1898	Hard water.....	828
N. W. Curry.....	D.	131	6	125	— 95			1905	.....do.....	829
William Wise.....	D.	185	7-6	185	— 58		19	1904	Soft water.....	830
.....do.....	O.	135	7-6		— 25			1903	Soft, slightly salty...	831
.....do.....	O.	175	6	162	— 13			1904	Soft water.....	832

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location	Owner.	Contractor.
833		Holt	New Point, sec. 8, T. 60, R. 37.	Mrs. Jane Hardman	
834		Howard	Armstrong, 8 m. SE. of	Frank Kerby	
835	Water	Howell	Brandsville, $\frac{1}{2}$ m. NE. of	Brandsville Fruit Farm Co.	B. R. Wescott & Son.
836	do	do	Koshkonong	Robert Fuller	
837	do	do	Koshkonong, 4 m. S. of, T. 21, R. 7.	Mrs. Barbara Vincent.	
838	do	do	Olden, sec. 23, T. 25, R. 9.	Olden Fruit Co.	W. F. McClurg
839	do	do	West Plains; 3 m. SE. of, sec. 8, T. 35, R. 24.	Frisco Ore Mining Co.	Frisco Ore Mining Co.
840	Water	do	West Plains	Frisco R. R.	Cook Well Co.
841	do	do	West Plains, $\frac{1}{4}$ m. N. of	City of West Plains	
842	do	do	West Plains	do	J. S. Pritchett
843	do	do	do	do	
^a 844		Jackson	Kansas City, 10 m. SE. of		
845	Gas	do	Kansas City, corner Twenty-eighth and Olive streets.	Howard Vrooman	
846	Water	Jasper	Carthage, $1\frac{1}{4}$ m. E. of	James Duke	
847		do	Carthage, $7\frac{1}{2}$ m. S. of, sec. 10, T. 27, R. 31.	Lena Bowman	
848	Water	do	Duenweg, $\frac{1}{4}$ m. S. of, sec. 10, T. 27, R. 32.	L. G. Knight	
849		do	Duenweg, 2 m. NE. of	S. D. Mitchell	
850		do	Joplin, 1 m. S. of, sec. 10, T. 27, R. 33.	J. W. Freeman	
851		do	Joplin, $\frac{1}{4}$ m. S. of	Tim McCarthy	
852		do	Joplin, $3\frac{1}{2}$ m. SE. of, sec. 7, T. 27, R. 32.	Rex Mining and Smelting Co.	Rex Mining and Smelting Co.
853		do	Prosperity		
854		do	Reeds, near post-office, T. 28, R. 30.	City of Reeds	
855		do	Webb City, 2 m. W. of	W. A. Dougherty	
856		do	Webb City, near post-office.	Herrod Brothers	
857	Water	Jefferson	De Soto, 2 m. S. of, sec. 10, T. 39, R. 4.	Chris Campbell	J. W. Washburn
858	do	do	De Soto, $\frac{1}{2}$ m. S. of	City of De Soto	A. Zeuser
859		do	Hematite, $1\frac{1}{2}$ m. SE. of	John Null	
860	Water	do	Kimmswick, 3 m. NW. of	C. W. Beehler	Fred J. Miller
861		do	Kimmswick, $\frac{1}{4}$ m. N. of	Columbia Excursion Co.	do

^a See detailed record at end of table.

SUMMARY OF DRILLING.

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reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Isaac Rhodes.....	M.	<i>Ft.</i> 260	<i>In.</i> 3	<i>Ft.</i> 200	<i>Ft.</i> -100	.....	.....	1890	Soft, salty.....	833
G. B. Young.....	D.	214	6	.....	.....	.....	.....	.....	Dry hole. (L.).....	834
B. R. Wescott.....	D.	500	6	.....	-100	.....	60	1903	Soft water; first water at 85 feet.	835
J. L. Pickle.....	D.	100	6	90	- 50	.....	.....	1902	Hard water; also at 52 feet.	836
Chapin & Myers...	M.	130	6	100	- 75	.....	.....	1904	Hard water.....	837
W. F. McClurg....	D.	960	10-4½	890	-475	.....	.....	1898	.....do.....	838
.....	O.	505	8-6	.....	.....	.....	.....	1905	Hard water; small flow. (L. S.).....	839
Cook Well Co.....	M.	575	10	.....	.....	.....	80	1897	Hard water.....	840
J. S. Pritchett.....	M.	475	10-8	150	-125	.....	80	1900	Hard water; city supply.	841
.....do.....	C.	600	10	400	-125	.....	.....	1902	Some water at 125 feet; part of city supply. (L.)	842
.....	.....	580	12-8	500	-125	.....	.....	1893	.....	843
.....	M.	2,401	.....	.....	.....	.....	.....	.....	Diamond drill hole. (L.)	844
J. H. Williams.....	O.	455	6-4½	.....	.....	.....	.....	1905	Yield about 410,000 cubic feet; initial pressure, 200 pounds.	845
Sam'l Mouker.....	M.	227	5	160	-110	.....	.....	1903	Hard. (L.).....	846
C. W. Bowman.....	D.	215	5½	175	- 65	.....	.....	1899	Hard water.....	847
.....	M.	130	6	120	- 40	.....	.....	1899	Soft water, good supply.	848
S. N. Smith.....	D.	655	6	.....	-180	.....	.....	1904	Test hole for ore; water at 350-500 feet; soft. (L.)	849
H. B. Crossman...	D.	908	6½-5½	875	-120	.....	.....	1901	Soft, sulphur-bearing; supplies 75 buildings.	850
H. W. Atherton...	D.	300	7½-5½	60	- 15	.....	.....	1903	Hard water. (L.).....	851
W. R. Burchell...	O.	707½	6	.....	- 40	.....	.....	1903	Test hole for ore; water is iron-bearing and is not used. (L.)	852
D. C. McConey....	D.	1,004	.....	985	.....	.....	.....	.....	.....	853
Walter Hood.....	D.	211	8-4	195	- 69	.....	3½	1901	Soft water; water at 65 and 109 feet.	854
.....	M.	150	6	120	- 10	.....	.....	1897	.....	855
D. C. McConey....	D.	825	7½-5½	807	-140	.....	.....	.....	Water at 560, 620, 700, and 720 feet; supply soft.	856
J. W. Washburn...	C.	125	6	30	- 30	.....	.....	1904	(L.).....	857
A. Zeuser.....	C.	303	12-10	290	+ 13	25	312	1905	2 wells; water, 86-90, 207-213, and 290-292 feet. Hard. (L. S.)	858
J. A. Hammond...	D.	300	1½	18	+ 8	3	.....	1902	Test hole for ore. (L.)	859
Wm. D. Miller.....	C.	221	6½	177	.....	.....	½	1905	(L. S.).....	860
F. J. Miller.....	C.	141	6½	138	- 73	.....	33½	.....	At 70 feet hard water; at 138 feet sulphur water. (L.)	861

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
862	Water..	Jefferson.....	Kimmswick.....	L. F. Kickham.....	
863	.....	Johnson.....	Leetón, $\frac{1}{2}$ m. SW. of....	Chicago, Rock Island and Pacific R. R.	Geo. Austin.....
864	Water..	Knox.....	Hurdland, near post-office.	Town of Hurdland..	
865	...do...	...do.....	Knox City, near post-office.	Town of Knox City..	
866	...do...	...do.....	Knox City, 8 m. SW. of.	Jack Rennen.....	A. A. Durand....
867	...do...	...do.....	Pleona, 3 m. NE. of....	Walter Campbell...	
868	...do...	Laclede.....	Lebanon.....	C. C. Beard.....	
869	...do...	...do.....	Lebanon, 3 m. S. of....	J. Hamatt.....	F. R. Eilenstein..
870	...do...	...do.....	Phillipsburg, 5 m. NW. of.	J. D. Mathers.....	
871	...do...	...do.....	Plato, sec. 28, T. 33, R. 12	F. L. Cook.....	
872	...do...	Lafayette.....	Dover, $\frac{1}{2}$ m. SE. of, sec. 32, T. —, R. 32.	John Philips.....	
873	...do...	...do.....	Higginsville, 2 m. N. of.	Confederate Home..	
874	...do...	...do.....	Higginsville, $\frac{1}{2}$ m. N. of.	Henry Fahrmeier...	
875	...do...	Lawrence.....	Freistatt, 2 m. W. of, sec. 31, T. —, R. 26.	Wm. Worm, jr.....	
876	...do...	...do.....	Pierce City, $\frac{1}{2}$ m. N. of, sec. 32, T. 27, R. 28.	John J. Spilman....	O. J. Spilman....
877	...do...	...do.....	Pierce City, $\frac{3}{4}$ m. W. of, sec. 7, T. 26, R. 28.	J. L. Wight.....	
878	...do...	...do.....	Verona, $\frac{3}{4}$ m. N. of, sec. 8, T. 26, R. 26.	G. H. Ruggles.....	J. W. Young.....
879	Water..	...do.....	Wentworth, $2\frac{1}{2}$ m. SE. of	W. P. Wight.....	
880	...do...	Lincoln.....	Ethlyn, near post-office, T. 48, R. 2.	George S. Brown....	
881	...do...	Linn.....	Brookfield, 3 m. NE. of.	H. J. Kukukuck.....	
882	...do...	...do.....	St. Catherine, $\frac{1}{2}$ m. NW. of.	E. Turney.....	Rouze & Walker..
883	...do..?	...do.....	Meadville, 2 m. S. of, sec. 13, T. 57, R. 22.	Hugh Hartshorne..	
884	...do...	Livingstone....	Dawn, $3\frac{1}{2}$ m. NW. of....	Gregory Lawson....	
885	...do...	McDonald.....	South West City, $\frac{1}{4}$ m. W. of.	Dr. B. F. Smith....	
886	...do...	...do.....	South West City, $\frac{3}{4}$ m. SW. of.	Jacob Winter.....	Sterner Bros.....
887	...do...	Macon.....	Anabell, $\frac{1}{4}$ m. N. of....	Mrs. Alexander.....	
888	...do...	...do.....	Macon, 4 m. SE. of....	S. T. Brock.....	S. D. Harris.....
889	...do...	...do.....	Macon, 5 m. E. of....	J. P. Brown.....	Rouze & Howell..
890	...do...	...do.....	Macon, 4 m. S. of....	C. A. Howell.....	
891	...do...	...do.....	Macon, 4 m. NW. of, sec. 6, T. 57, R. 14.	Thomas E. Wardell..	S. D. Harris.....
892	.....	Madison.....	Fredericktown.....	Alliance Mill Co....	
893	.....	...do.....	Fredericktown, near post-office.	Public.....	
894	Water..	Maries.....	Dixon, $3\frac{1}{2}$ m. N. of....	D. C. Creech.....	
895	...do...	...do.....	Linchell, 3 m. S. of....	Andy Davis.....	
896	...do...	...do.....	Meata, 2 m. SE. of....	Joseph Roberts.....	

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Thos. J. Kirk.....	D.	416	5½	400	-100	.....	.....	1895	Hard water. (L.).....	862
Geo. Austin.....	C.	1,214	8	1,200	.....	.....	60	.....	(L.).....	863
Swan Bros.....	M.	186	6-5	160	- 96	.....	6	1895	Hard, iron-bearing...	864
Thos. Caddick.....	M.	210	4	150	-125	.....	9	1892	.....	865
Geo. Griffith.....	D.	523	4½	520	.....	.....	15	1901	Water at 25-160 and 267-523 feet; supply salty. (L.)	866
C. W. Drenin.....	D.	300	5½	150	-125	.....	1½	1902	Hard water.....	867
P. M. Thomas.....	D.	126	6	114	-101	.....	.....	.....	.....	868
F. R. Eilenstein.....	D.	145	6	.....	.....	.....	.....	1900	Dry hole.....	869
P. M. Thomas.....	D.	155	6	137	.....	.....	.....	1904	Soft water.....	870
F. L. Cook.....	O.	146	6	125	-100	.....	.....	1895	Hard water. (L.).....	871
Henry Fahrmeier..	D.	116	7	82	- 40	.....	.....	1905	Soft water.....	872
.....do.....	D.	196	6	135	.....	.....	40	1904	.....	873
.....do.....	O.	150	7	.....	- 75	.....	35	1902	Water at 70, 115, and 135 feet; soft.	874
.....do.....	O.	156	6	156	- 44	.....	.....	1898	Soft water. (L.).....	875
O. J. Spilman.....	O.	120	6	90	- 35	.....	.....	1897	Hard water.....	876
J. C. Wight and W. P. Wight.	O.	140	5½	121	- 60	.....	.....	1901	Soft water. (L.).....	877
F. Lechner.....	O.	208	12-5½	84	- 4	.....	.....	1900	Test hole for ore. (L.)	878
W. P. Wight.....	D.	117	6	.....	- 70	.....	.....	1899	Soft water.....	879
Val Cox.....	O.	187	6	185	- 52	.....	.....	1904	Soft water. (L.).....	880
A. L. Rouze.....	D.	122	.....	.....	.....	.....	.....	1905	(S.).....	881
.....do.....	D.	144	5½-4½	118	- 70	.....	500	1905	Water at 118-144 feet. (L. S.)	882
W. C. Hazen.....	D.	175	2	175	- 80	.....	6	1885	Hard water.....	883
Dempsey & Thomas.	D.	421	7-5½	356	+ 5	1	.....	1898	Salty; fresh water at 30 feet.	884
Sterner Bros.....	D.	112	6	109	- 17	.....	15	1905	Sulphureted. (L.)...	885
.....do.....	D.	110	6	108	- 92	.....	.....	1905	Water at 70 feet; soft water. (L.)	886
J. O. Harvie.....	D.	130	3	130	- 30	.....	.....	1891	.....	887
S. D. Harris.....	C.	115	6	95	- 20	.....	.....	1903	(L.).....	888
Rouze & Howell...	C.	151	5½	98	- 50	.....	.....	1904	Hard water. (L.)...	889
A. L. Rouze.....	D.	230	.....	.....	.....	.....	.....	1905	(S.).....	890
S. D. Harris.....	C.	300	6	290	- 90	.....	3	1901	Hard water; water at 160 feet also.	891
Tom Watkins.....	D.	215	6	.....	- 8	.....	.....	.....	.....	892
.....do.....	D.	150	.....	.....	- 30	.....	.....	.....	.....	893
F. A. Sudheimer...	D.	118	.....	118	- 75	.....	.....	.....	Hard.....	894
T. D. Lair.....	D.	137	6½-5½	123	-113	.....	.....	1900	Hard water.....	895
E. C. Pendleton...	D.	100	6	70	± 0	.....	2	1902	Hard water at 20, 40 and 50 feet.	896

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
897	Water	Maries	Vienna, 8 m. W. of	Albert Burns	
898		Marion	Nelsonville, 3 m. S. of, sec. 8, T. 59, R. 8.	C. H. Mohr	
899	Oil	do	Nelsonville, 3 m. S. of, sec. 21, T. 59, R. 8.	do	
900	do	do	Monroe City, 3½ m. NW. of, sec. 3, T. 56, R. 8.	W. R. Jackson	
901	Water	Mercer	Ravanna, 5 m. E. of, sec. 16, T. 65, R. 22.	Holenbeck	
902		Miller	Eldon	Arthur Hecker	
903		do	Eugene, 3 m. SW. of, sec. 13, T. 41, R. 14.	Bell Tunnel Mining Co.	
904	Water	do	Iberia, 4 m. SE. of	W. T. Ferguson	A. Y. Johnston
905	do	Moniteau	Fortuna, 3 m. SW. of, sec. 31, T. 44, R. 17.	R. E. Doman	L. W. Beauland
907	do	do	Fortuna, near post-office.	Town of Fortuna	
908	do	do	Excelsior, 3 m. NE. of, sec. 9, T. 43, R. 16.	Benj. Frost	
909		do	Fortuna, 5 m. E. of	Jim Gray	
910		Monroe	Paris, 2½ m. SE. of	Monroe County poor farm.	
911	Water	Montgomery	Buell, ¾ m. SW. of, sec. 11, T. 49, R. 5.	D. U. Hensley	
912	do	do	Buell, 1¼ m. SE. of, sec. 13, T. 49, R. 5.	H. A. Winter	
913	do	do	Middletown, 3¼ m. SE. of, sec. 17, T. 50, R. 4.	W. S. Davidson	
914	do	do	Montgomery City, 4 m. E. of, sec. 35, T. 49, R. 5.	M. L. Hall	
915	do	Morgan	Florence, 3 m. W. of	David Doughman	
916	do	do	Florence, 1 m. SW. of	Henry Hartman	
917		do	Enid, 3½ m. SE. of, sec. 32, T. 43, R. 16.	L. W. Beauland	
918	Water	do	Enid, 3½ m. W. of, sec. 32, T. 43, R. 16.	do	
919		do	Fortuna, ¾ m. S. of	Mary M. Mining Co.	
920	Water	do	Otterville, 3 m. S. of, sec. 32, T. 45, R. 19.	Jas. W. Finley	
921		New Madrid	Morehouse, sec. 31, T. 26, R. 13.	Himmelberger-Harrison Lumber Co.	Wilson & Sweeting.
922		Newton	Diamond	W. H. Leathers	
923	Water	do	Diamond, 1½ m. NE. of, sec. 31, T. 27, R. 32.	Leathers Bros.	Leathers Bros.
924		do	Diamond, 3½ m. W. of, sec. 1, T. 26, R. 32.	W. A. Parnell	
925		do	Diamond, 3½ m. W. of, sec. 1, T. 26, R. 32.	do	
926		do	Granby, 4½ m. N. of, sec. 7, T. 26, R. 30.	W. R. Holley	S. T. Shank
927	Water	do	Granby, 3 m. S. of	Bert West	
928		do	Neosho, 1 m. N. of		

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
E. C. Pendleton . . .	D.	114	7-6	100	- 45	.....	.....	1905	Hard water.....	897
C. H. Mohr.....	O.	720	4½	685	Flows.	14	.....	1903	Salty alkaline water; fresh water at 165 feet. (L.)	898
.....do.....	O.	875	5½-4½	600	+ 12	10	.....	1903	Salt sulphur water; show of gas at 510 feet. (L.)	899
C. S. Jackson.....	D.	700	12-6	80	- 15'	.....	.....	.....	Uncompleted.....	900
J. M. Robertson...	D.	175	18	170	.....	.....	.....	1901	Hard water. (L.)....	901
Charles McDonald.	D.	502	8	400	- 45	.....	.....	1902	Used by locomotives .	902
Chas. E. Miller.....	.....	236	6	60	- 20	.....	.....	1904	(L.).....	903
A. Y. Johnston.....	C.	115	8	102	.....	.....	2	1901	Hard water. (L.)...	904
L. W. Beauland...	C.	200	6	.....	.....	.....	4	1905	Water 20, 60-80, 150-160, and 190-200 feet. (L. S.)	905
Chas. E. Miller....	D.	236	6	100	.....	.....	.....	1903	Hard water, from 100-236 feet; town supply.	907
O. E. Cochran.....	M.	115	6	115	.....	.....	3	1905	Hard water; also at 96 feet.	908
Charles McDonald.	D.	205	6	100	Flows.	.....	.....	1901	Test hole for ore. (L.)	909
W. T. Robinson...	D.	430	5½-3	420	- 90	.....	.....	1904	Soft water.....	910
Chas. Newbert....	O.	220	4½	125	- 65	.....	.....	1901	Water, hard.....	911
W. M. Hensley....	O.	120	8	100	- 60	.....	.....	1904	Hard water.....	912
Newbert.....	O.	202	6-4	190	- 30	.....	10	1901	Hard iron-bearing water.	913
W. T. Hensley....	O.	116	6-5½	96	- 67	.....	1	1902	Hard water.....	914
H. C. Bremer.....	D.	108	7-6	75	- 66	.....	.....	1905	.....do.....	915
Henry Hartman...	O.	119	6	105	- 20	.....	.....	1897	.....do.....	916
.....	O.	120	6	120	.....	.....	.....	.....	Well No. 2.....	917
C. E. Pendleton...	D.	219	7-6	85	Flows.	2	.....	1898	Hard water; well No.1	918
Chas. E. Miller....	D.	211	6	60	Flows.	.....	.....	1902	Test hole for ore; hard water. (L.)	919
Henry Hartman...	.....	156	6½	150	-100	.....	26	1896	Hard water.....	920
.....	O.	780	.....	.....	+ 20	.....	.....	.....	(L.).....	921
W. H. Leathers....	O.	210	6	100	.....	.....	.....	.....	.....	922
.....do.....	O.	217	6	160	- 45	.....	.....	1905	Hard water. (L.)....	923
W. A. Parnell.....	O.	200	5½	140	.....	.....	.....	1903	Test hole for ore. (L.)	924
.....do.....	O.	148	5½	35	.....	.....	.....	1903	Test hole for ore; soft water. (L.)	925
S. T. Shank.....	C.	130	6	120	- 40	.....	3	.....	.....	926
M. N. Beyer.....	D.	244	.....	.....	.....	.....	.....	1905	(S.).....	927
Bushner Bros.....	M.	390	.....	.....	Flows.	.....	.....	.....	.....	928

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
929	Water.	Newton.....	Neosho, $\frac{3}{4}$ m. SE. of, sec. 30, T. 25, R. 31.	U. S. Bureau of Fisheries.	.....
930	do.	do.	Neosho, 1 m. N. of....	Jesse Vassar.....	.....
931	do.	do.	Seneca, $\frac{1}{2}$ m. NE. of....	D. W. Gahagan.....	.....
932	do.	do.	Seneca, sec. 25, T. 25, R. 34.	Newton County Fruit Farm Co.	.....
933	Water.	do.	Seneca, sec. 36, T. 25, R. 34.	do.	.....
934	do.	Nodaway.....	Burlington Junction, 5 m. NW. of.	Marie Bowman.....	W. H. Miller.....
935	Oil.	do.	Burlington Junction, 1 m. S. of.	Nodaway Valley Oil, Gas, and Mineral Co.	.....
936	do.	do.	Hopkins, 3 m. NE. of...	Steve Henderson...	.....
937	Water.	do.	Hopkins, $\frac{1}{2}$ m. W. of, sec. 2, T. 66, R. 35.	J. C. Pistole.....	.....
938	do.	Osage.....	Freeburg.....	Town of Freeburg..	Thos. Schonnecker, jr.
939	do.	Oregon.....	Thayer, 7 m. N. of, sec. 2, T. 22, R. 5.	Math Baertecht....	J. L. Pickle.....
940	do.	Ozark.....	Bakersfield, 1 m. SW. of, T. 22, R. 11.	John Paris.....	.....
941	do.	Perry.....	Perryville.....	Village of Perryville	.....
942	do.	Pettis.....	Hughsville, 2 m. E. of...	Raymond Voight...	.....
943	do.	do.	Lutman, 2 m. W. of....	H. Bartel.....	H. Bremer.....
945	do.	do.	Lutman, $3\frac{1}{2}$ m. E. of....	Beacksack school house.	do.
946	do.	do.	Lutman, 1 m. S. of....	Bingen schoolhouse.	do.
947	do.	do.	Lutman, 4 m. W. of....	H. Bremer.....	do.
948	do.	do.	Lutman, 3 m. E. of....	F. Brill.....	do.
949	do.	do.	Lutman, 3 m. W. of....	Mary Ann Chulcoat	do.
950	do.	do.	Lutman, $\frac{1}{2}$ m. E. of....	J. Dorman.....	do.
951	do.	do.	Lutman, 4 m. W. of....	D. Doughman.....	do.
952	do.	do.	Lutman, 4 m. S. of....	B. Evans.....	do.
953	do.	do.	Lutman, $1\frac{1}{2}$ m. W. of....	H. Geshion.....	do.
954	do.	do.	Lutman, $4\frac{1}{2}$ m. E. of....	J. Hevins.....	do.
955	do.	do.	Lutman, 2 m. S. of....	J. H. Kahrs.....	do.
956	do.	do.	Lutman, 4 m. N. of....	H. Kurtz.....	do.
957	do.	do.	Lutman, 5 m. W. of....	C. Meacham.....	do.
958	do.	do.	Lutman, 1 m. E. of....	Methodist Church of Lutman.	do.
959	do.	do.	Lutman, 4 m. S. of....	C. Meyer.....	do.
960	do.	do.	Lutman, 1 m. E. of....	H. Meyer.....	do.
961	do.	do.	Lutman, $2\frac{1}{2}$ m. W. of....	do.	do.
962	do.	do.	Lutman, $3\frac{1}{2}$ m. E. of....	C. Rags.....	do.
963	do.	do.	Lutman, 5 m. W. of....	F. Seigel.....	do.
964	do.	do.	Lutman, $4\frac{1}{2}$ m. W. of....	M. Thomas.....	do.
965	do.	do.	Lutman, 2 m. E. of....	H. Weshes.....	do.
966	do.	do.	Lutman, $5\frac{1}{2}$ m. E. of....	Wm. Wunsternan...	do.
967	do.	do.	Sedalia, 4 m. NE. of....	Smith Rissler.....	.....
968	do.	do.	Smithton, $\frac{1}{2}$ m. NW. of.	Eliza Hotsenpiller..
969	do.	do.	Smithton, $2\frac{1}{2}$ m. N. of..	L. M. Mouseses.....

SUMMARY OF DRILLING.

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reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Fred North.....	M.	292	5½	.....	Flows.	.....	.....	1899	Soft sulphur water....	929
John Bushner.....	O.	195	6	190	+ 23	2	.....	1903	.....do.....	930
W. B. Powell.....	O.	170	6	.....	- 70	.....	4	.....	Fine soft water.....	931
.....	O.	170	5½	.....	-140	.....	.....	.....	Small flow.....	932
.....	O.	130	5½	.....	- 75	.....	.....	1903	Hard water; small supply; not used. (L.)	933
.....	C.	110	12	110	- 80	.....	.....	1905	(L.).....	934
Bigelow & Williams.	M.	1,903	10-6	.....	.....	.....	.....	1905	Flows salt water from 1,200 feet.	935
.....	M.	432½	4	.....	- 30	.....	.....	1895	Hard water.....	936
Frank Nannah....	O.	315	5-4	35	- 20	.....	.....	1900	Water hard and salty.	937
Buck Crane.....	D.	164	6	.....	- 94	.....	.....	1905	Hard water. (L.)....	938
J. L. Pickle.....	C.	130	6	.....	.....	.....	½	1905	(L. S.).....	939
W. L. Fowler.....	D.	161	6	160	-150	.....	.....	1905	Trace of oil. (L.)....	940
Jas. M. Hahn.....	M.	511	5½	200	-170	.....	12	1904	Hard water.....	941
J. B. Ellison.....	D.	253	6	.....	.....	.....	.....	1905	No water. (L.).....	942
H. Bremer.....	D.	100	.....	40	.....	.....	2	.....	.....	943
.....do.....	D.	123	.....	40	.....	.....	1½	.....	.....	945
.....do.....	D.	101	.....	60	.....	.....	3	.....	.....	946
.....do.....	D.	112	.....	50	.....	.....	4	.....	.....	947
.....do.....	D.	111	.....	90	.....	.....	.....	.....	.....	948
.....do.....	D.	136	.....	30	.....	.....	3	.....	.....	949
.....do.....	D.	200	.....	115	.....	.....	.....	.....	.....	950
.....do.....	D.	100	.....	48	.....	.....	.....	.....	.....	951
.....do.....	D.	100	.....	40	.....	.....	2	.....	.....	952
.....do.....	D.	128	6	70	.....	.....	3	.....	.....	953
.....do.....	D.	148	.....	50	.....	3	.....	.....	.....	954
.....do.....	D.	125	.....	105	.....	.....	.....	.....	.....	955
.....do.....	D.	148	.....	40	.....	.....	2	.....	.....	956
.....do.....	D.	190	.....	150	.....	.....	.....	.....	.....	957
.....do.....	D.	130	.....	100	.....	.....	.....	.....	.....	958
.....do.....	D.	160	.....	30	.....	.....	4	.....	.....	959
.....do.....	D.	128	.....	90	.....	.....	3	.....	.....	960
.....do.....	D.	148	.....	60	.....	.....	3	.....	.....	961
.....do.....	D.	115	.....	70	.....	.....	4	.....	.....	962
.....do.....	D.	112	.....	40	.....	.....	3	.....	.....	963
.....do.....	D.	115	.....	40	.....	.....	1½	.....	.....	964
.....do.....	D.	125	.....	100	.....	Large	.....	.....	.....	965
.....do.....	D.	112	.....	70	.....	.....	4	.....	.....	966
J. B. Ellison.....	M.	152	6	130	- 50	.....	.....	1904	Hard.....	967
G. W. Yeager.....	D.	232	6	230	-132	.....	2	1905	Water at 118-215 feet; supply hard. (L.)	968
J. B. Ellison.....	M.	160	6	135	- 30	.....	.....	1904	Hard.....	969

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
970	Water	Phelps	Edgar Springs, 2 m. W. of.	W. R. Denison	
971	do	do	Elk Prairie, sec. 35	W. A. Stedman	
972	do	do	Lacoma, 3 m. NW. of.	Huntly	
973	do	do	Newburg, 3 m. S. of.	Hecker Mineral Co.	
973a	do	do	Newburg, 2½ m. N. of.	John Willson	Maier & Bell
974	do	do	Rolla, 8 m. SE. of, sec. 34, T. 37, R. 7.	Herman F. Benad	
975	do	do	Rolla, 6 m. E. of.	Fred Hirt	
976	do	do	Rolla, sec. 33, T. 37, R. 7.	Loy King	Steadman & Green
977	do	do	Rolla, near post-office, sec. 25, T. 38, R. 9.	Albert Maier	
978		Pulaski			
979		do	Crocker		
980	Water	do	Crocker, sec. 12, T. 37, R. 13.	M. Agener	
981	do	do	Crocker, 1½ m. W. of, sec. 13, T. 37, R. 13.	M. Holtsman	
982	do	do	Crocker, 2½ m. W. of, T. 37, R. 13.	W. M. Holtsman	
983		do	Dixon, 5 m. SE. of.		
984	Water	do	Dixon, 1 m. W. of.	Dixon Charcoal Co.	
985	do	do	Dixon	R. T. Harrison	
986	do	do	Dixon, 2 m. SW. of.	St. Louis Development Co.	
987	do	do	Hancock, 2½ m. SW. of, sec. 23, T. 36, R. 13.	M. O. Mitchell	
988	do	do	Swedeberg, near post-office, sec. 24, T. 37, R. 13.	N. Snyder	
989	do	Ralls	Nadine, ¾ m. of, sec. 26, T. 53, R. 6.	G. W. Colvert	
990	do	do	Perry, 7 m. S. of.	G. W. Allen	W. H. La Due
991	do	do	Perry, 3½ m. NE. of.	J. A. Clark	
992	do	do	Perry, 6 m. SW. of.	Jno. Clever	W. Smith
993	do	do	Vandalia, 8 m. N. of.	Obe Fuqua	
995	Oil	Randolph	Randolph Springs, sec. 32, T. 54, R. 15.	Chas. Dameron	
996	Water	Ripley	Grandin, 3 m. S. of.	Levi Shinn	
997		Ste. Francois	Farmington, near post-office.	Reuter Milling Co.	
998	Water	Ste. Genevieve	Lawrenceton, near post-office.	D. F. Loida	
999	do	do	Spratt, 3 m. S. of.	Joseph C. Loida	
1000		St. Louis	Fenton, 4 m. E. of.	Mrs. Schaeffer	
1001	Water	do	Maltese, 3 m. SW. of.	Theo. Hagemann	Fred J. Miller
1002	do	do	Maltese, 3 m. W. of.	Henry Hagemann	do
1003	do	do	Maltese, 3½ m. SW. of.	Henry Studer	do
1004	do	do	St. Louis, 3 m. S. of.	Lucas Duffner	
1005	Gas	do	St. Louis, 1½ m. SW. of, block 2186.	Fruin - Bambick Construction Co.	H. W. Steinsiek

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
F. L. Cook.....	D.	178	6	170	-165			1900	Hard water.....	970
Stedman Bros.....	O	100	6	80				1899	Water a little hard...	971
Corey & Main.....	D.	104	6	65	- 65			1904	Hard water.....	972
Albert Maier.....	D.	200	6		- 15				Test hole for ore. (L.)	973
W. A. Corey.....	D.	101	6	80				1905	(L.).....	973a
B. Phillips.....	O.	139	6	115				1900		974
Albert Maier.....	D.	130	6	130				1902	Hard water.....	975
Steadman & Green.	D.	120	6	100	- 50			1899	do.....	976
Albert Maier.....	D.	100	6	60	- 42			1902	do.....	977
do.....	D.	400	6-5	350	- 15			1890	Water at 150 feet; test hole for ore.	978
J. P. Caldwell.....	D.	157	6						10 feet of water at 45 feet; dry at bottom.	979
do.....	D.	102	6	65	- 58			1900	Hard water.....	980
do.....	D.	112	6	106	- 25			1898	Sulphur water.....	981
do.....	M.	140	6						Hard water.....	982
A. Y. Johnson.....	D.	235	8-7		-200			1898	do.....	983
L. R. Phillips.....	D.	160						1903	No water. (L.)	984
A. Y. Johnson.....	D.	121	8-7	60	- 40		1	1896	Hard water. (L.)	985
L. R. Phillips.....	D.	161	6	145	-140			1903	do.....	986
J. P. Caldwell.....	D.	147	6		-138			1899	Sulphur water. (L.)	987
do.....	D.	110	6	97	- 45			1898	Hard water. (L.)	988
G. W. Colvert.....	O.	189	4½	180	- 50		2	1902	Hard water; seep at 50 feet. (L.)	989
W. H. La Due.....	C.	395	5	390	- 75		5	1904	(L.).....	990
do.....	D.	445	5½	440	- 80		7	1904	Soft water. (L.)	991
W. Smith.....	D.	322	5½	312	- 50		2	1905	Hard water; little water at 200 feet. (L.)	992
W. D. McDonald..	D.	306	8-5½	306	-106			1905		993
Wheeler.....	M.	916	4	515	+ 20	3		1867	Mineral water.....	995
Levi Shinn.....	O.	190	6	130	130			1900	Hard water.....	996
do.....	O.	255	6-4	250			50	1898	Soft water.....	997
A. Buineger.....	O.	113	6	112	+ 2	2		1895	Hard water.....	998
Joseph C. Loida...	O.	125	6	70	- 40			1902	Soft water.....	999
Henry Ehlers.....	D.	118	6							1000
Wm. D. Miller.....		266	6					1905	(L.).....	1001
do.....	C.	127	6				½	1905	do.....	1002
do.....	C.	108	6				½	1905	do.....	1003
Chas. Becker.....	D.	242	6½-5		- 85			1902		1004
H. W. Steinsiek...	C	786	7½-5½					1905	Gas at 531 feet; pressure 130 pounds (L. S.)	1005

Summary of well drilling

MISSOURI—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1006	Water..	St. Louis	Valley Park, 1 m. W. of.	S. P. Keys	
1007	...do...	Schuyler	Coatesville, 3½ m. NE. of	John Burger	
1008	...do...	...do	Coatesville, NE. of	Cort Frakes	
1009	...do...	...do	Downing	Town of Downing ..	
1010	...do...	...do	Lancaster, near post-office.	W. P. Hall	
1011	...do...	...do	Lancaster, 4½ m. SE. of.	C. Whicklock	
1012	...do...	Scotland	Rutledge, 4 m. of	J. A. Forgmer	
1013	...do...	...do	Rutledge, 4 m. NW. of, sec. 20, T. 64, R. 11.	E. E. Wilsey	
1014	...do...	...do	Rutledge, 2½ m. W. of, sec. 28, T. 64, R. 11.	William Lingenfetter.	
1015	...do...	Scott	Benton, near post-office, sec. 13, T. 28, R. 13.	Scott County	C. S. Wise
1016	...do...	Shelby	Epworth, 2 m. NE. of, T. 59, R. 11.	J. S. Brathers	
1017	...do...	...do	Epworth, near post-office, sec. 26, T. 59, R. 11.	C. M. Drennen	
1018	...do...	...do	Epworth, 1 m. N. of, sec. 23, T. 59, R. 11.	Chas. Wester	
1019	...do...	...do	Hunnewell, 5 m. N. of, sec. 15, T. 59, R. 9.	S. T. Blackburn	C. H. Mohr
1020	...do...	...do	Hunnewell, 6 m. NW. of, sec. 22, T. 57, R. 9.	G. W. Perry	
1021	Water..	...do	Kirby, T. 58, R. 11	Robert Stewart	
1022	...do...	...do	Kirby, ½ m. NE. of	Dan Weems	
1023	Water..	...do	Shelbyville, 8 m. SW. of.	Henry Arnold	
1024	...do...	...do	Shelbyville, ½ m. NW. of	Shelby County	
1025	...do...	Taney	Mincy, 3½ m. NE. of	C. W. Moore	
1026	...do...	...do	Protom	Jas. Blankinship ..	
1027	Water..	Texas	Eunice	B. F. Cooper	
1028	...do...	...do	Eunice, 1 m. E. of, T. 29, R. 8.	V. B. Garrison	
1029	...do...	...do	Odd, 1 m. W. of	Alfred Saltsgaver ..	
1030	Water..	...do	Oscar, 1½ m. N. of	J. W. Thornton	
1031	...do...	...do	Tyrone, near post-office.	R. W. Hammond	
1032	...do...	Vernon	Nevada, 1 m. S. of	Nevada Gas, Oil and Asphalt Co.	
1033	Oil .....	...do	Sheldon, 4½ m. E. of	C. E. Brand	
1034	Water..	Warren	Warrensburg, 1½ m. W. of	Heberling Bros.	J. L. Harness
1035	...do...	...do	Wright City, 3 m. S. of.	Peter Kuhn	
1036	...do...	...do	Wright City, near post-office.	Wright City	
1037	...do...	Wright	Manes, near post-office.	Dr. J. J. Evans	

reported in 1905—Continued.

MISSOURI—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Thos. J. Kirk.....		<i>Ft.</i> 309	<i>In.</i> 6	<i>Ft.</i> 309	<i>Ft.</i> + 8			1902	Salty sulphur water; water at 75 feet.	1006
Frank Hardin.....	D.	106	6	101	- 66				(L.).....	1007
.....do.....	D.	116	6	109					Hard water.....	1008
.....do.....		116	5½-4½	105	- 78			1900	Hard water. (L.).....	1009
.....do.....	M.	362	6	360						1010
Frank Hardin.....	D.	260	6-4	259	-130			1899	Hard water.....	1011
E. A. Wilsey.....	D.	315	6	310	- 65			1899	.....do.....	1012
.....do.....	O.	405	6	188	- 70			1900	.....do.....	1013
Chas. Hall.....	D.	500	8-5	490	- 80		1½	1905	.....do.....	1014
L. L. Hume and J. Ferno.	M.	1,500	8-5½	1,400	-120		500	1904	Water at 180, 440, and 600 feet; alkaline. magnesia water. (L. S.)	1015
J. S. Brather & Co.	M.	121	5½	121				1904		1016
C. M. Drennen.....	D.	126	5½	126	- 61			1898	Good supply of hard water. (L.)	1017
Drennan & Baker.	M.	130	6	80					Hard water.....	1018
W. P. Harrison....	C.	121	4½	112			5	1905	(L. S.).....	1019
C. H. Mohr.....	M.	200					1½	1905	Test hole for ore. (L. S.)	1020
C. H. Tanner.....	D.	117	5½		- 67			1900	Hard water.....	1021
C. M. Drennan.....	D.	136		130	- 50				Hard water. (L.).....	1022
C. H. Tanner.....	D.	300	5½		- 40		3	1903	Hard water.....	1023
Wm. Sneed.....	M.	174	6-4	174	- 47			1904	.....do.....	1024
Z. P. Moore.....	D.	180	6	170	-165			1900	Soft water.....	1025
.....do.....	D.	125	7-6	75					Hard water.....	1026
J. H. Wood.....	D.	100	6	100	- 89			1899		1027
.....do.....	D.	122	6	120	-115			1899	Hard water.....	1028
Minor & McKinney.	D.	100	7-5½					1902	Test hole for ore.....	1029
J. H. Wood.....	D.	132	6	120	- 22			1898	Hard water.....	1030
Ellsworth Callier..	D.	110	6	80				1901	.....do.....	1031
J. M. Thompson....	O.	1,803	13-4½	630	+ 10	7		1905	Sulphur water; well drilled for gas or oil.	1032
E. H. Lehman.....		1,406	10-6					1903	Water at 150, 400, and 1,100 feet; yields sulphur water; not used.	1033
J. L. Harness.....	C.	129	6½	117			2	1905	(L.).....	1034
.....do.....	M.	205	6	175	-100		3	1893	Hard water.....	1035
.....do.....	M.	123	6	93	- 80			1884	.....do.....	1036
Minor & McKinney.	D.	112	7-6	90	- 65				Hard water; little at 65 feet.	1037

*Summary of well drilling***MONTANA.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1038	Oil.....	Flathead.....	Belton, 40 m. NW. of, sec. 12, T. 36, R. 21.	Kintla Lake Oil Co.	.....
a1039	.....do.....	Teton.....	Altyn, 8 m. SE. of.....	St. Marys Oil Co.	.....
1040	.....do.....	.....do.....	Altyn, 3 m. E. of.....	Swift Current Oil Co.	.....

NEBRASKA.

1041	Water..	Cheyenne.....	Weyerts, 5 m. W. of, sec. 34, T. 16, R. 45.	Geo. H. Miller.....	.....
1042	.....do.....	.....do.....	Weyerts 6 m. NW. of.....	H. G. Miller.....	George H. Miller..
1043	.....do.....	.....do.....	Weyerts, 7 m. NW. of, sec. 34, T. 16, R. 48.	George Thompson.....	.....do.....
1044	.....do.....	Wayne.....	Wayne, 1 m. N. of.....	J. M. Pile.....	.....
1045	Oil.....	Webster.....	Rosemont, 1½ m. SE. of, sec. 29, T. 4, R. 9, well No. 2, on Rose farm.	Class Rose.....	.....

NEW HAMPSHIRE.

1046	Water..	Hillsboro.....	Manchester, 1¼ m. SW. of.	True W. Jones Brewing Co.	Artesian Well and Supply Co.
1047	.....	Strafford.....	Dover, 1 m. N. of.....	Dover City Water-works.	.....
1048	Water..	.....do.....	Dover.....	Luddy & Currier...	Artesian Well and Supply Co.

NEW JERSEY.

1048	Water..	Atlantic.....	Atlantic City, Galen Hall.	.....	T. B. Harper.....
1049	.....do.....	Camden.....	Camden, 6 m. NE. of Morris Station.	Camden Water-works.	.....
1050	.....do.....	Essex.....	Newark, 1½ m. E. of....	P. Ballantine & Sons.	.....
1051	.....do.....	.....do.....	.....do.....	.....do.....	.....
1052	.....do.....	.....do.....	.....do.....	.....do.....	.....

a See detailed record at end of table.

reported in 1905—Continued.

MONTANA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. C. Leonard.....	D.	<i>Ft.</i> 1,340	<i>In.</i> 18-8	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>	1904	Drilling stopped by heavy flow of water. (L.)	1038
W. A. & Frank Leonard.	D.	1,530	10-6	.....	.....	.....	.....	1905	No water below 15 feet; oil shows at 870, 890, 900 feet; gas at 1,260 feet. (L.S.)	1039
J. C. Leonard.....	D.	.....	.....	.....	.....	.....	.....	1905	Show of oil and gas at 445-475 feet; show of oil at 840-885 feet; no water below 75 feet. (L.S.)	1040

NEBRASKA.

Geo. H. Miller.....	O.	200	6	192	.....	.....	.....	1900	Soft water.....	1041
.....do.....	C.	250	6	230	.....	.....	.....	1903	.....do.....	1042
.....do.....	C.	210	6-5	190	.....	.....	.....	1904	.....do.....	1043
D. E. Newton.....	M.	126	2	126	-85	.....	.....	1893	Hard water. (L.)....	1044
H. & L. Rose.....	O.	550	10-8	.....	.....	.....	.....	.....	Abandoned. (L.)....	1045

NEW HAMPSHIRE.

M. F. Knauf.....	O.	1,004	8	800	-10	.....	12	1905	Hard water at 350, 800' and 970 feet; no water above 280 feet; temperature 53°. (L.S.)	1046
J. A. Stubbs.....	M.	226	6	.....	.....	.....	50	.....	1 of 4 wells, others do not yield water. (L.)	1047
Frank Mentzer....	D.	107	8	28	-10	.....	60	1905	Water at 80 feet; soft. (L.S.)	1048

NEW JERSEY.

.....	C.	840	.....	.....	.....	.....	.....	1905	(S.).....	1048
Redpath & Potter.	O.	120	8	120	-15	.....	.....	1905	Plant has 12 6-inch, 88 8-inch wells; water soft. (S.)	1049
.....	O.	500	8	.....	-40	.....	300	.....	Freeman street well; hard water; used for cooling and condensing.	1050
.....	O.	450	12-8	.....	-40	.....	300	.....	Ferry street well; hard water; used for ammonia condensing.	1051
.....	O.	500	.....	10-5	-40	.....	300	.....	Yard well; hard water; used for cooling.	1052

Summary of well drilling

NEW JERSEY—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1053	Water	Essex.....	Newark, $\frac{1}{2}$ m. E. of....	P. Ballantine & Sons.	.....
1054	do	do	do	do	P. H. & J. Conlan.
1055	do	do	do	do	do
1056		do	Newark	do	
1057	Water	do	Milburn, $2\frac{1}{2}$ m. NW. of	City of East Orange	P. H. & J. Conlan.
1058	do	Gloucester.....	Hurffville.....	Bethel M. E. Church	C. J. Davenport
1059	do	Mercer.....	Princeton, $1\frac{1}{2}$ m. S. of...	Princeton Water Co.	Thomas B. Harper.
1060	do	Middlesex.....	Perth Amboy.....	R. H. Chemical Co.	Stothoff Bros....
1061	do	Monmouth.....	Fort Hancock, Sandy Hook.	United States.....	Thos. B. Harper..
1062	do	Passaic.....	Paterson, 10 m. N. of...	Lafin & Rand Powder Co.	do
1063	do	Rahway.....	Rahway, corner St. George avenue and Hamilton street.	W. L. Mershon.....	F. T. Cladek.....
1064	do	Salem.....	Fort Mott.....	United States.....	
1065	do	do	Fort Delaware.....	do	
1066	do	Somerset.....	Bernardsville.....	S. S. Childs.....	Stothoff Bros....
1067	do	do	Bernardsville, $1\frac{1}{2}$ m. NE. of.	do	do
1068	do	do	Bernardsville.....	J. E. Hulchizer.....	
1069	do	do	do	Dean Sage.....	
1070	do	do	do	G. C. Smith.....	Stothoff Bros....
1071	do	Union.....	Linden, 1 m. E. of....	Rosehill Cemetery..	F. T. Cladek.....
1072	do	do	Rahway, 2 m. SW. of, at Colonia.	Chas. D. Freeman...	do
1073	do	Warren.....	Brainards, near post-office.	Seitz Brewing Co...	

NEW MEXICO.

1066	Water	Bernalillo.....	Albuquerque, 5 m. E. of		
1067	do	do	Albuquerque, 8 m. E. of	City of Albuquerque	
1068		Chaves.....	Dexter.....	P. P. Clark	
	Water	do	Dexter, $4\frac{1}{2}$ m. SW. of, sec. 31, T. 13 R. 26.	N. J. Wishell.....	
1069	do	do	Dexter, $2\frac{1}{2}$ m. E. of....	H. C. Owen.....	
1070	do	do	Hagerman, $\frac{1}{2}$ m. N. of, sec. 10, T. 14, R. 26.	J. J. Hagerman....	American well works.

* See detailed record at end of table.

reported in 1905—Continued.

NEW JERSEY—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	O.	1,202	12-8	60	-35	.....	.....	1904	Water at 60, 300, and 500 feet; well abandoned on account of small flow at 300 and 500 feet.	1053
P. H. & J. Conlan	O.	600	10-8	.....	-25	.....	75	1895	Hard alkaline water; used for cooling coils.	1054
.....do.....	O.	856	12-8	150	-25	.....	150	1905	Hard alkaline water; used for cooling coils and washing.	1055
.....	M.	600	8	50-100	-8	150	.....	1868	Water at 200 feet; no longer used.	1056
.....	M.	$\left\{ \begin{array}{l} 54 \\ \text{to} \\ 158 \end{array} \right\}$	6-8	b 110	b + 20	c 513	.....	1904	20 wells; total flow 3,500,000 gallons a day; pump 5,280,000 gallons a day. (L.)	1057
C. J. Davenport	C.	115	2	.....	-12	.....	20	1905	Good. (L.)	1058
J. M. Keisse and S. Yerkes.	D.	490	8	.....	.....	.....	100	1904	(L. S.)	1059
Walter Barbour	C.	142	.....	.....	.....	.....	.....	1905	(S.)	1060
Jas. Rooney	C.	365	8	325	.....	.....	60	1905	(L. S.)	1061
A. J. Fox	D.	128	8	.....	.....	.....	2	1905	Abandoned. (L.)	1062
F. T. Cladek	C.	101	5	90	.....	.....	30	1905	(L.)	1063
.....	M.	309	.....	.....	.....	.....	100	.....	.....	1064
.....	M.	373	.....	.....	.....	.....	50	.....	Well flows at high tide	1065
J. S. Lewis	C.	730	.....	.....	.....	.....	.....	1905	(S.)	1066
Hiram Stall	C.	140	8	123	-21	.....	35	1905	(S.)	1067
Stothoff Bros.	D.	190	.....	.....	.....	.....	.....	1905	(S.)	1068
J. S. Lewis	.....	103	.....	.....	.....	.....	.....	1905	(S.)	1069
Walter Barbour	C.	151	.....	.....	.....	.....	.....	1905	(S.)	1070
F. T. Cladek	C.	209	6	209	-20	.....	20	1905	(L.)	1071
.....do.....	C.	153	5	90	-36	.....	21	1905	.....	1072
Stothoff Bros.	D.	140	6	.....	-90	.....	18	1904	Hard. (S.)	1073

NEW MEXICO.

.....	M.	450	.....	450	.....	.....	.....	1904	.....	1066
A. D. Johnson	.....	434	5½	418	.....	.....	50	.....	Test well; good water	1067
.....	O.	532	8-7	532	Flows.	400	.....	.....	Water at 290 and 385 feet. (L.)	1068
E. A. Warren	D.	1,025	8	945	Flows.	1,100	.....	1905	(L.)	1068
.....do.....	D.	1,130	8-6	960	Flows.	.....	.....	1905	Good water; bitter water at 495 feet; a little water at 385 feet. (L.)	1069
Fred Allison	M.	1,225	6	1,200	+ 80	777	.....	.....	Water at 150, 370, and 840 feet; main supply; slightly sulphuretted; domestic use and irrigation.	1070

b Average.

c Highest.

Summary of well drilling

NEW MEXICO—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1071	Water..	Chaves	Lake Arthur, $\frac{1}{2}$ m. N. of, sec. 20, T. 15, R. 26.	Lake Arthur Town-Site Co.	.....
1072	...do...	...do.....	Lake Arthur, $1\frac{1}{2}$ m. NW. of, sec. 13, T. 15, R. 25.	H. H. Sigman & Co.	American Well Drilling Co.
1073	...do...	Donna Ana.....	Cambray, 12 m. S. of, sec. 6, T. 20, R. 4.	J. O. Biggs.....	Humbolt Casad..
1074	...do...	...do.....	Cambray, 14 m. E. of, sec. 30, T. 25, R. 2.	Henry F. Brock.....	.....
1075	...do...	...do.....	Cambray, 25 m. N. of, sec. 31, T. 21, R. 2.	F. N. Hall .....	.....
1076	.....	...do.....	Organ, 12 m. SW. of	Turney & Taylor.....	.....
a 1077	Water..	Eddy.....	Artesia, $3\frac{1}{2}$ m. N. of, sec. 32, T. 16, R. 26.	Burge & Davis.....	E. L. Robertson..
1078	...do...	...do.....	Artesia, $\frac{3}{4}$ m. E. of, sec. 9, T. 17, R. 26.	C. A. Call and B. Hadley.	.....
1079	...do...	...do.....	Artesia, $2\frac{1}{2}$ m. W. of, sec. 13, T. 16, R. 26.	Clark, Woodworth & Alison.	.....
1080	...do...	...do.....	Artesia, $1\frac{3}{4}$ m. SE. of, sec. 15, T. 17, R. 26.	J. C. Hale & Son .....	.....
1081	...do...	...do.....	Artesia, $3\frac{1}{2}$ m. SW. of, sec. 25, T. 17, R. 25.	C. L. Higday.....	Patrick Bros.....
1082	...do...	...do.....	Artesia, 7 m. NW. of, sec. 24, T. 16, R. 25.	Abram L. Norfleet .....	.....
1083	...do...	...do.....	Artesia, 6 m. NE. of, sec. 14, T. 16, R. 26.	John Richey.....	Chapman & Sperry
1084	...do...	...do.....	Artesia, 3 m. SW. of, sec. 29, T. 17, R. 26.	John W. Skaer.....	.....
1085	...do...	...do.....	Artesia, 3 m. SW. of, sec. 19, T. 17, R. 26.	Spencer, Gilbert & Blair.	.....
1086	...do...	...do.....	Artesia, 5 m. NW. of, sec. 19, T. 16, R. 26.	G. Talbot and G. P. Lowry.	.....
1087	...do...	...do.....	Artesia, 4 m. S. of.....	Watkins, Hale & Davidson.	Davidson.....
1088	...do...	...do.....	Artesia, $2\frac{1}{2}$ m. SE. of, sec. 28, T. 17, R. 26.	W. M. Watterscheid.	.....
1089	...do...	...do.....	Carlsbad, 10 m. SW. of	D. H. Lucas.....	.....
1090	...do...	...do.....	Dayton, 3 m. NE. of, sec. 23, T. 18, R. 26.	Clarence House.....	Eugene Lattion..
1091	...do...	...do.....	Lakewood, SE. of.....	Jack Brodgan.....	C. L. McCleary ..
1092	...do...	...do.....	Lakewood, sec. 36, T. 27, R. 19.	Lakewood Town-Site Co.	.....
1093	...do...	Guadalupe	Pastura, 18 m. SE. of, sec. 18, T. 4, R. 21.	Salado Live Stock Co.	.....
1094	...do...	...do.....	Pastura, 14 m. SE. of, T. 5, R. 20.	...do.....	J. Bucking.....
1095	...do...	...do.....	Pintada.....	El Paso and North-eastern R. R.	.....
1096	Oil.....	...do.....	Santa Rosa, 5 m. NW. of	Missouri Oil and Asphalt Co.	Missouri Oil and Asphalt Co.

a See detailed record at end of table.

reported in 1905—Continued.

NEW MEXICO—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
C. C. Mull.....	O.	<i>Ft.</i> 1,024	<i>In.</i> 8-6	<i>Ft.</i> 1,016	Flows.	.....	.....	1905	Hard sulphur; water at 360 feet.	1071
.....	M.	991	8½-6	930	+ 39	2,300	.....	1904	Water at 230 and 400 feet. (L.)	1072
Humbolt Casad...	O.	266	6	260	-160	.....	10	1902	Water slightly alkaline.	1073
.....do.....	O.	240	6	225	-225	.....	18	1902	Soft water. (L.)	1074
Sam Kimball.....	O.	175	6	175	-150	.....	18	1904	Soft water.	1075
Jas. H. Sewell....	D.	389	6-5	380	.....	.....	.....	.....	Hard; at 346 feet also.	1076.
Whaley & Feemster.	C.	932	6	820	+ 90	680	.....	1905	Hard water. (L.)	1077
L. R. Sperry.....	O.	942	6	935	+130	1,627	.....	1905	Hard water; domestic use and irrigation; water also at 798-825 feet. (L.)	1078
Whaley & Feemster.	O.	815	6	812	.....	.....	.....	1905	.....	1079
White & Swearingen.	O.	950	6	820	Flows.	.....	.....	.....	Hard water; 2 wells, 1 completed in 1904, 1 in 1905. (L.)	1080
Patrick Bros.....	O.	677	6	670	Flows.	692	.....	1905	Hard water.	1081
J. C. Elliott.....	.....	750	6	740	+ 70	.....	.....	1905	Hard water; also at 450 feet.	1082
Chapman & Burkhart.	C.	961	8½-6	940	+103	1,700	.....	1904	Sulphur water at 93 and 500 feet; main supply hard; domestic use and irrigation. (L.)	1083
Heath Bros. & Co..	O.	756	6	740	Flows.	3,000	.....	1905	Hard water.	1084
Heath Bros.....	O.	860	8-6	845	Flows.	800	.....	1904	Soft; domestic use, irrigation; water at about 600 feet.	1085
G. M. Dauner.....	O.	795	6	790	+ 55	.....	.....	.....	Hard water.	1086
Davidson.....	O.	735	8-6	735	+100	.....	3,500	1905	Hard water; domestic use and irrigation.	1087
L. R. Sperry.....	O.	795½	6	720	+115	1,522½	.....	1905	Soft water.	1088
R. J. McCulley....	D.	175	6½-5½	160	.....	.....	.....	1905	.....do.....	1089
Eugene Lattion....	C.	790	10-6½	625	Flows.	.....	300	1905	Good water; also at 300 and 500 feet.	1090
C. L. McCleary....	C.	372	5	362	Flows.	.....	.....	1904	First flow at 192 feet; soft water.	1091
Brice & Fisher.....	O.	1,000	8-6	.....	.....	400	.....	1905	Slightly sulphuretted; "oil sand" at 950-1,000 feet.	1092
Jos. Bucking.....	D.	300	8-6	280	- 42	.....	Small	1904	Alkaline water. (L.)	1093
.....	C.	150	7	145	- 95	.....	Small	1904	Hard water. (L.)	1094
.....	O.	160	.....	140	- 90	.....	.....	.....	do.	1095
J. A. Peter.....	.....	570	9½	185	-170	.....	15	1902	do.	1096

Summary of well drilling

MEW MEXICO—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1097	Oil.....	Guadalupe	Santa Rosa, 5 m. NW. of	Missouri Oil and Asphalt Co.	.....
1098	Water.....	.....do.....	Santa Rosa 4 m. SW. of	Phelps, Dodge & Co.	.....
1099	.....do.....	.....do.....	Santa Rosa.....	Pintada Copper Co.	.....
1100	Oil	Lincoln.....	Ancho, 1½ m. W. of.....	Comrey Oil Co .....	.....
1101	Water.....	.....do.....	Corona, 4 m. NE. of.....	El Paso and North-eastern R. R.	.....
1102	.....do.....	.....do.....	Corona, 16 m. E. of.....	J. D. Rountree.....	.....
1103	.....do.....	.....do.....	Jaconilla, 2 m. SW. of.....	Wisconsin Milling and Smelting Co.	.....
1104	Water.....	Luna.....	Deming.....	W. J. Warnel.....	.....
1105	.....do.....	Otero.....	Alamogordo, 20 m. NE. of	El Paso and North-eastern Rwy.	Gus Mulholland ..
1106	.....do.....	Potter.....	Amarillo, ¼ m. NE. of ..	Amarillo Water, Light and Power Co.	.....
1107	.....do.....	Roosevelt.....	Portales, on court-house square, sec. 26, T. 1, R. 34.	.....	.....
1108	.....do.....	Santa Fe.....	Lamy.....	Atchison, Topeka and Santa Fe Rwy.	.....
1109	.....o.....	.....do.....	Santa Fe, 2 m. S. of.....	United States.....	Gus Mulholland ..
1110	.....do.....	Socorro.....	Magdalena, 8 m. W. of.....	F. G. Bartlett.....	.....
1111	.....do.....	.....do.....	Magdalena, 17 m. SW. of	.....do.....	.....
1112	.....do.....	.....do.....	Magdalena, 27 m. SW. of	.....do.....	.....
1113	.....do.....	.....do.....	Magdalena, 15 m. W. of.....	James L. Davis .....	.....
1114	Water.....	Torrance.....	Corona, 10 m. E. of	Jesse Bond.....	.....
1115	.....do.....	.....do.....	Duran, 5 m. N. of, sec. 28, T. 4, R. 15.	A. P. Buck.....	.....
1116	.....do.....	.....do.....	Encino, 7½ m. NW. of, sec. 11, T. 6, R. 13.	Nicanor Trujillo.....	.....
1117	.....do.....	.....do.....	Encino, 9½ m. N. of, sec. 27, T. 7, R. 14.	.....do.....	.....
1118	.....do.....	.....do.....	Estancia, 2½ m. S. of, sec. 26, T. 6, R. 8.	H. C. Williams.....	.....
1119	.....do.....	.....do.....	Pinos Wells, 7 m. W. of	A. B. McDonald.....	S. H. Pickens.....
a 1120	.....do.....	.....do.....	Torrance, 1 m. SW. of.....	El Paso and North-eastern Rwy.	.....
1121	.....do.....	.....do.....	Torrance, 7 m. W. of, T. 2, R. 12.	Robert Owen.....	.....
1122	.....do.....	.....do.....	Willard, ½ m. E. of.....	Eastern Rwy. of New Mexico.	McVay.....
1123	.....do.....	Union.....	Clayton, ½ m. S. of, sec. 35.	N. E. Charlton.....	John Howel.....
1124	.....do.....	.....do.....	Clayton, 14 m. NE. of, T. 29, R. 35.	J. L. De Haven.....	.....
1125	.....do.....	.....do.....	Kenton, 19 m. S. of, sec. 36, T. 30, R. 36.	W. P. Plunkett .....	.....
1126	.....do.....	.....do.....	Kenton, 12 m. W. of.....	Sater Copper Co.....	.....
1127	.....do.....	.....do.....	Valley, 6½ m. SE. of, sec. 3, T. 31, R. 34.	Frances E. Anderson.	.....

a See detailed record at end of table.

reported in 1905—Continued.

NEW MEXICO—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. I. Peters.....	D.	1,070	9 $\frac{1}{2}$	780	-362	.....	40.	1902	Water at 90 feet; 125 feet hard water. (L.)	1097
M. Hamlin.....	M.	700	10-8	692	-550	.....	30	1902	Alkaline water; used by locomotive.	1098
J. Peters.....	D.	354	6	.....	20	.....	.....	1903	Hard water. (L.)....	1099
H. S. Comrey.....	D.	420	7-6	320	-310	.....	.....	1904	Hard water at 15-20 feet; salty at 320 feet; not used.	1100
.....	O.	850	.....	550	-357	.....	.....	.....	.....	1101
J. D. Rountree.....	O.	457	6 $\frac{1}{2}$	417	-400	.....	15	1904	Sulphur water. (L.)	1102
John Brotherton.....	O.	200	6	.....	.....	.....	600	.....	Soft water; water at 60 and 90 feet.	1103
.....	O.	110	48-6	100	-44	.....	.....	.....	Water at 50 feet.....	1104
Geo. H. Myers.....	.....	800	12-8	478	.....	.....	42	1905	(L. S.).....	1105
.....	O.	274	66-192	268	-228	.....	200	1905	Dug well; water soft. (L.)	1106
H. R. McGee.....	M.	1,000	.....	.....	.....	.....	.....	1905	Not used; well flowed when completed.	1107
S. W. Sunday.....	O.	320	8 $\frac{1}{2}$	278	.....	.....	30	1905	Water 38-40 feet and 150-170 feet. (L. S.)	1108
Gus Mulholland.....	C.	984	11 $\frac{1}{2}$ -6	.....	.....	.....	.....	1905	No water. (L. S.)....	1109
F. G. Bartlett.....	O.	225	4 $\frac{1}{2}$	180	-45	.....	.....	1901	Soft water; good supply.	1110
J. L. Davis.....	O.	300	5	217	.....	.....	20	.....	Soft water.....	1111
.....do.....	O.	240	5	200	-200	.....	.....	.....	Hard water; good supply.	1112
James L. Davis.....	M.	480	5	280	.....	.....	.....	.....	Unfinished; soft water. (L.)	1113
Jesse Bond.....	O.	200	7-5	180	-100	.....	6	1904	Alkaline water; also at 103 feet.	1114
A. P. Buck.....	O.	300	8-6 $\frac{1}{2}$	295	-80	.....	10 $\frac{1}{2}$	1904	Seep at 140 feet. (L.)	1115
Adolfo Trujillo.....	O.	217	6	.....	-90	.....	10	1904	Good water. (L.)....	1116
.....do.....	O.	280	6	.....	-140	.....	10	1904	Hard; slightly alkaline. (L.)	1117
H. C. Williams.....	O.	318	12-7 $\frac{1}{2}$	303	-3 $\frac{1}{2}$	.....	40	1904	Sulphur water. (L.)	1118
S. H. Pickens.....	C.	210	6 $\frac{1}{2}$ -5 $\frac{1}{2}$	170	-170	.....	20	1904	Soft water.....	1119
.....	O.	853	.....	550	-357	.....	.....	.....	Hard water. (L.)....	1120
W. W. Simpson.....	O.	208	6	185	-135	.....	6	1903	Water very hard; contains gypsum. (L.)	1121
.....	O.	152	13-10	147	-35	.....	170	1905	Water medium hard. (L.)	1122
John Howel.....	O.	160 $\frac{1}{2}$	7	159	-142	.....	13	1903	Soft; water at 125 feet.	1123
D. C. Johnson.....	D.	300	7 $\frac{1}{2}$ -6 $\frac{1}{2}$	52	-50	.....	$\frac{1}{2}$	1902	Soft water; 17 inches coal at 180 feet.	1124
.....do.....	D.	190	7 $\frac{1}{2}$ -6	190	-115	.....	20	1902	Soft water.....	1125
Frank Anderson.....	D.	125	6 $\frac{1}{2}$ -5 $\frac{1}{2}$	45	-30	.....	6	1904	Water "medium soft"	1126
.....do.....	D.	120	6 $\frac{1}{2}$ -5 $\frac{1}{2}$	110	-40	.....	.....	1902	Soft water.....	1127

Summary of well drilling

NEW YORK.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1128	Oil	Allegany	Alma, lot 97	Norton Oil Co.	Norton Oil Co.
1129	do	do	Andover, Lynch farm	do	do
1130	do	do	Andover, Perry farm	Perry Farm Oil Co.	
1131	Water	do	Caneadea, 2 m. W. of	Arthur Kellogg	S. W. Wildrick
1132	Oil	do	Richburg	T. J. Bardeen	
1133	do	do	Scio, J. E. Middaugh farm	Gordon Brook Oil and Gas Co.	
1134	do	do	Scio	Norton Oil Co.	
1135	Oil	Cattaraugus	Allegany, Waldeck farm	Nenno Bros.	
1136	Water	do	Ellicottville, 4 m. NW. of	Homer Hollister	
1137	do	do	Ellicottville, 1½ m. N. of	Charles Mahl	
1138	Water	do	Franklinville, 3 m. SW. of	Mrs. A. J. Carter	S. Wildrick
1139	do	do	Freedom	Mrs. B. B. Holms	
1140	do	do	Napoli, 2¼ m. NE. of; T. 3, R. 8.	Robert Edgar	
1141	do	do	Napoli, ½ m. S. of	Bert Wilcox	
1142	do	Cayuga	Sempronius, 1 m. W. of	Meritte Wilcox	
1143	Oil	Chautauqua	Jamestown, ¼ m. E. of post-office	Broadheads	
1144	Water	Chemung	Breesport	Breesport Deep Rock Water Co.	
1145	do	Chenango	Mount Upton	O. T. Angel	James A. Gordon
1146	do	do	Norwich, 1½ m. N. of	St. Paul's Cemetery Association	do
1146a	do	do	Norwich, 7 m. W. of	John P. Childs	do
1147	do	do	Norwich, 6 m. SE. of	Edgar Phetterplace	do
1148	do	do	Rockwells Mills, 1 m. NW. of	Joseph Hamilton	do
1149	do	Columbia	Claverack	A. E. Kline	
1150	do	do	Harlemville, 1 m. E. of	A. D. Curtis	Germantown Artesian Well Co.
1151	do	do	Hudson	Uniform Brick Co.	
1152	do	do	Walshville	Empire Brick Co.	
1153	do	Cortland	Homer, ¼ m. W. of	Homer Milk Station	
1154	do	do	Homer, 4 m. NE. of	C. O. Newton	
1155	do	Delaware	Sidney, 1 m. S. of	M. Johnson	S. B. Blakeslee & Son
1156	do	Dutchess	Hyde Park, 2 m. S. of	Mrs. James Roosevelt	W. E. Cross
1157	do	do	Matteawan	State Hospital	S. P. O'Donnell
1158	do	do	Pleasant Valley	Union free school	

reported in 1905—Continued.

NEW YORK.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Geo. Hill.....	O.	1,721	.....	.....	.....	.....	.....	1905	(S.).....	1128
L. E. Norton.....	O.	1,171	.....	.....	.....	.....	.....	1905	(S.).....	1129
W. H. Norton.....	D.	1,083	.....	.....	.....	.....	.....	1905	(L. S.).....	1130
Glenn Wildrick....	C.	103	5½	100	— 54	.....	4	1905	Water at 40 feet. (L.S.)	1131
A. A. Bardeen.....	D.	1,150	.....	.....	.....	.....	.....	1905	(S.).....	1132
Manley McQueen..	M.	690	.....	.....	.....	.....	.....	1905	(S.).....	1133
E. Maloney.....	M.	687	.....	.....	.....	.....	.....	1905	(S.).....	1134
.....	O.	1,040	8-6½	.....	.....	.....	a 10	1905	(L. S.).....	1135
J. W. Pettit.....	D.	120	4	120	Flows.	.....	.....	.....	Has head of over +10 feet.	1136
.....do.....	D.	102	4	15	+ 3	.....	.....	1903	Not used; sulphur water. Gas at 56 and 73 feet; heavy oil at 56 and 87 feet.	1137
Glenn Wildrick....	D.	155	5½-4½	.....	.....	.....	3	1905	Water at 140-147 and 153-155 feet. (L.S.)	1138
Adam Knapp.....	D.	230	6	.....	.....	.....	.....	1905	(S.).....	1139
C. J. Bushnell.....	D.	129	5½	126	— 114	.....	.....	1905	Soft water. (S.).....	1140
.....do.....	D.	136	5½	130	.....	.....	.....	.....	.....	1141
L. C. Barber.....	D.	114	6-5	.....	— 3	.....	20	1902	.....	1142
C. H. Westerman..	D.	3,360	5½	200	— 20	.....	.....	1896	No oil found; water soft.	1143
M. McDugell.....	O.	190	5½	180	Flows.	.....	.....	1905	Soft water.....	1144
James A. Gordon..	C.	113	6	.....	— 40	.....	3	1905	Water at 60-65 and 108-110 feet. (L.)	1145
.....do.....	C.	183	6	.....	.....	.....	20	1905	(L.).....	1146
.....do.....	C.	110	6	105	.....	.....	5	1905	(L.).....	1146a
.....do.....	C.	198	6	.....	— 50	.....	2	1905	Water at 40-50 and 150-160 feet. (S.)	1147
.....do.....	C.	120	6	100	— 40	.....	3	1905	Soft water at 45-60 and 80-90 feet. (L. S.)	1148
Allen Rockefeller..	D.	140	6	.....	.....	.....	.....	1905	(S.).....	1149
H. S. Sipperly....	C.	225	6	200	— 221	.....	2	1905	Soft water. (L.).....	1150
Allen Rockefeller..	.....	100	6	.....	.....	.....	.....	1905	(S.).....	1151
Germantown Arterian Well Co.	M.	150	.....	.....	.....	.....	.....	1905	(S.).....	1152
L. C. Barber.....	D.	158	5	.....	.....	.....	.....	1903	Water at 35 feet; well abandoned.	1153
.....do.....	D.	151	5	150	— 20	.....	10	1905	Soft water.....	1154
S. B. Blakeslee & Son.	.....	160	2	160	.....	.....	8	1905	Little water at 75-95 and 130-150 feet. (L. S.)	1155
W. E. Cross.....	C.	131	5½	.....	— 21	.....	10	1905	Water at 28-30. and 110-130 feet. (L. S.)	1156
.....	C.	3,150	.....	450	.....	.....	13	1905	No water below 450 feet. (L.)	1157
Wm. E. Cross.....	D.	470	5½-4	135	.....	.....	30	1905	No water below 137 feet; supply bad; strong sulphur; well abandoned. (L. S.)	1158

a Barrels a day.

Summary of well drilling

NEW YORK—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1159	Oil	Dutchess	Poughkeepsie, $\frac{1}{2}$ m. SW. of.	Frank's brewery ...	Edward Ennest ..
1160	...do....	...do....	Poughkeepsie, 2 m. NE. of.	E. D. Smith.....	Wm. E. Cross....
1161	...do....	...do....	Poughkeepsie, $\frac{1}{2}$ m. E. of	Mrs. Grant Smith..	Edward Ennest ..
1162	...do....	...do....	Rhinebeck, $\frac{1}{4}$ m. E. of.	Rhinebeck Water Co.	.....
1163	Gas.....	Erie.....	Getzville, 2 m. S. of; well No. 1, G. G. Wolf farm.	Geo. G. Wolf.....	Geo. G. Wolf.....
1164	Water..	Essex.....	Lake Placid, 3 m. S. of.	Lake Placid Co.....	Germantown Artesian Well Co.
1165	Gas.....	Genesee.....	Pavilion, $\frac{1}{4}$ m. NE. of; well No. 1 on Page farm.	Pavilion Natural Gas Co.	Buffalo Gas Drilling Co.
1166	Water..	Greene.....	Tannersville, 2 m. N. of.	Miss E. Wakemann.	Germantown Artesian Well Co.
1167	Gas.....	Jefferson.....	Adams Center.....	.....	S. P. O'Donnell...
1168	Water..	Kings.....	Barren Island.....	E. Frank Coe Co....	Thos. B. Harper..
1169	...do....	Livingston.....	Dansville, 3 m. W. of.	N. P. Coverd.....	P. J. Didas.....
1170	...do....	...do....	East Avon, $2\frac{1}{2}$ m. S. of.	Mrs. F. N. Isham....	...do....
1171	...do....	...do....	Genesee, 5 m. NW. of.	Alex. Huston.....	...do....
1172	Water..	...do....	Genesee, 5 m. E. of.	George Tomb.....	...do....
1173	...do....	...do....	Livonia, 1 m. N. of.	Harry Pease.....	...do....
1174	...do....	Montgomery.....	Marshville, $\frac{1}{4}$ m. S. of.	Lester Bergh.....	.....
1175	...do....	...do....	Sprakers, 1 m. S. of.	Wm. Rickard.....	.....
1176	...do....	...do....	Sprout Brook, $\frac{1}{2}$ m. E. of.	Lester Bergh.....	.....
1177	...do....	Nassau.....	Millneck, 1 m. N. of.	Irving Cox.....	Chas. N. Danis....
1178	...do....	New York.....	Borough of Manhattan.	Mutual Milk and Cream Co.	F. A. Bennett....
1179	...do....	...do....	Borough of Bronx.....	Consumers' Ice Co.	...do....
1180	...do....	Oneida.....	Babeock Hill.....	Welsh Bros.....	J. H. & P. H. Foley
1181	...do....	...do....	Bridgewater, 2 m. N. of.	Mrs. Anna Aller.....	.....
1182	...do....	...do....	Bridgewater, $\frac{1}{2}$ m. SW. of.	Mr. Rider.....	.....
1183	Gas.....	Onondaga.....	Baldwinsville.....	.....	S. P. O'Donnell...
1184	...do....	...do....	Warners.....	.....	...do....
1185	...do....	Ontario.....	Honeoye.....	Honeoye Light and Heat Co.	.....
1186	Oil.....	Orange.....	Amity.....	McEwen & Norton Oil Co.	Norton Oil Co....
1187	Water..	...do....	Lake.....	Jesse Halbert.....	Stothoff Bros....
1188	Gas.....	Oswego.....	Oswego.....	.....	S. P. O'Donnell...
1189	...do....	...do....	Pulaski.....	Pulaski Natural Gas and Oil Co.
1190	...do....	...do....	...do....	S. P. O'Donnell...

a See detailed record at end of table.

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NEW YORK—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Edward Ennest . . .	C.	402	6	150	- 15	.....	12	1905	.....	1159
Wm. E. Cross	C.	114	5½-4	.....	.....	.....	20	1905	Water at 30-50 and 80-90 feet. (L. S.)	1160
Edward Ennest . . .	C.	110	6	.....	.....	.....	3	1905	Sulphur water.	1161
E. J. Sanders.	O.	300	8	280	- 1	.....	60	1905	Water at 100 feet.	1162
Fred Stahl.	D.	800	8-6	.....	.....	.....	.....	1903	Initial pressure, 280 pounds; fresh water at 40 feet; sulphur water at 330 feet; gas at 485-495, 505, and 565 feet. (L.)	1163
Chauncey Hover. . .	C.	155	8-6	150	-130	.....	10	1905	(L.)	1164
.....	O.	1,799	8½-6½	.....	.....	.....	.....	1905	Initial yield, 100,000 cubic feet; pressure, 800 pounds; salt water at 1,380 feet; hole nearly dry till then. (L.)	1165
Jacob L. Coon	C.	139	6	128	- 60	.....	3	1905	(L.)	1166
.....	C.	950	.....	.....	.....	.....	.....	.....	Little gas.	1167
F. A. Magee	C.	709	6-4½	708	.....	.....	.....	1904	Flowing well. (L.S.).	1168
P. J. Didas	C.	116	5	42	- 36	.....	½	1905	Hard, slightly sulphuretted; little gas 98-116 feet. (L. S.)	1169
do.	C.	113	45-5	.....	.....	.....	3	1905	(L. S.)	1170
do.	C.	150	5	.....	- 48	.....	.....	1905	(L. S.)	1171
do.	C.	174	36-5	.....	.....	.....	½	1905	(L. S.)	1172
do.	C.	176½	5	175	85	.....	6	1905	Soft. (L. S.)	1173
Lester Bergh	O.	220	5-4½	220	.....	.....	.....	1905	Water at 130 feet; also soft. (L.)	1174
Adams & Bergh . . .	D.	131	6	.....	.....	.....	.....	1905	(S.)	1175
Lester Bergh	O.	120	5	120	+ 20	8	.....	1905	Soft water.	1176
E. I. Danis	C.	356	2½	326	+ 15	100	.....	1905	do.	1177
F. A. Bennett	C.	710	.....	.....	.....	.....	.....	1905	(S.)	1178
.....	C.	440	.....	.....	.....	.....	.....	1905	(S.)	1179
John H. Foley . . .	D.	178	6	.....	.....	.....	7	1903	(L.)	1180
Alex. T. Gibson . . .	D.	170	6	160	- 15	.....	.....	1905	.....	1181
.....	M.	230	6	.....	± 0	.....	.....	1902	Sulphur water; not used.	1182
.....	C.	3,095	.....	.....	.....	.....	.....	.....	Fair show of gas. (L.)	1183
.....	C.	3,600	.....	.....	.....	.....	.....	.....	Gas at 354 feet. (L.)	1184
A. B. Andrews . . .	O.	740	.....	.....	.....	.....	.....	1905	(S.)	1185
Geo. Harris.	O.	1,091	.....	.....	.....	.....	.....	1905	(S.)	1186
J. S. Lewis	D.	331	.....	.....	.....	.....	.....	1905	(S.)	1187
.....	C.	2,015	.....	.....	.....	.....	.....	.....	Dry hole. (L.)	1188
.....	O.	1,040	.....	.....	.....	.....	.....	.....	.....	1189
.....	C.	1,570	.....	.....	.....	.....	.....	.....	(L.)	1190

*Summary of well drilling***NEW YORK**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1191	Water..	Otsego.....	Leonardsville, 1½ m. E. of.	Jim Flyburger.....	J. H. & P. H. Foley.
1192	...do...	Rockland.....	Congers.....	J. Joyce.....	C. F. Underwood.
1193	...do...	...do.....	Hillburn, ⅓ m. N. of.	Rockland Electric Light Co.	H. E. Estes.....
1194	Gas.....	St. Lawrence...	Massina Springs.....	.....	S. P. O'Donnell...
a1195	Water..	Saratoga.....	Geyserville.....	Frank Hathorn.....	.....
1196	...do...	...do.....	Ballston Spa, Whalen Flats.	Baker Well Co.....	A. E. Hilton.....
1197	...do...	...do.....	Sandy Hill, ½ m. SW. of.	Union Bag and Paper Co.	Hudson Engineering and Construction Co.
1198	Oil.....	Steuben.....	Greenwood.....	M. Tyler.....	R. McMichaels.....
1199	.....	Suffolk.....	Lark Field, Sand Island	Captain Clark.....	H. J. Dubois.....
1200	Water..	Sullivan.....	Fallsburg.....	L. Hoffman.....	.....
1201	...do...	...do.....	Narrowsburg.....	Frank Kinney.....	.....
1202	...do...	Tompkins.....	Ithaca, 1 m. SSW. of...	Bradford Almy.....	.....
1203	...do...	Washington.....	Salem, ⅓ m. W. of.....	W. P. Church.....	.....
1204	...do...	Westchester.....	Mount Vernon.....	Mauser Manufacturing Co.	.....
1205	...do...	...do.....	Croton on the Hudson..	Wm. Geppert.....	H. M. Ripley.....
1206	...do...	...do.....	Pocantico Hills, 1½ m. NE. of.	St. Joseph's Normal College.	.....
1207	Gas.....	Yates.....	Branchport.....	Branchport M. P. Co.	.....

NORTH CAROLINA.

1208	Water..	Columbus.....	Dothan.....	J. P. Butler.....	.....
1209	...do...	...do.....	...do.....	Mrs. F. C. Cox.....	.....
1210	...do...	...do.....	...do.....	J. N. Cox.....	.....
1211	...do...	...do.....	...do.....	Dothan High School	.....
1212	...do...	...do.....	...do.....	W. E. Marten.....	.....
1213	...do...	...do.....	...do.....	W. A. Moslan.....	.....
1214	...do...	...do.....	Guide.....	G. F. Best.....	.....
1215	...do...	...do.....	Pireway.....	J. G. Butler.....	.....
1216	...do...	Davidson.....	Lexington.....	Board of commissioners of Lexington.	Sydnor Well and Pump Co.
a1217	...do...	Lenoir.....	Kinston.....	City of Kinston.....	.....
a1218	...do...	New Hanover...	Fort Caswell.....	United States.....	.....
1219	...do...	...do.....	...do.....	...do.....	.....
a1220	...do...	Moore.....	Pinhurst, at hotel.....	Leonard Tufts.....	Sydnor Well and Pump Co.

a See detailed record at end of table.

reported in 1905—Continued.

NEW YORK—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
John H. Foley.....	D.	<i>Ft.</i> 105½	<i>In</i> 6	<i>Ft.</i>	<i>Ft.</i>			1905	(L.).....	1191
J. Mussey.....	C.	115	6	80			20	1905	(L. S.).....	1192
C. Bartholomew.....	D.	657	8-6					1905	No water. (L. S.)...	1193
.....	C.	1,800							Dry hole. (L.).....	1194
E. J. Saunders.....	D.	670						1905	(S.).....	1195
H. A. Bingel.....	D.	840						1905	(L. S.).....	1196
.....	O.	200	10	200	— 24		100	1905	Soft water; temperature, 51°.	1197
R. McMichaels.....	C.	900						1905	Dry hole. (S.).....	1198
H. J. Dubois.....	C.	185							(S.).....	1199
Pierson Bros.....	D.	210						1905	(S.).....	1200
Ezra Selleck.....	D.	106						1905	(S.).....	1201
E. J. Strong.....	D.	525	6	100	— 14			1904	Alkaline water; no fresh water below 300 feet.	1202
Elmer Beaty.....	D.	125	1½	123	— 10		6	1899	(L.).....	1203
Jos. McAnslau & Bros.	D.	300						1905	(S.).....	1204
H. M. Ripley.....	C.	200	5-4				¾	1905	(L. S.).....	1205
Stothoff Bros.....	D.	700	6	200			7	1904	Hard water; also at 500 feet. (L. S.)	1206
Philo Lee and Ray Hiller.	M.	1,200						1905	Gas found from 108-1,050 feet; dry well. (L.)	1207

NORTH CAROLINA.

J. P. Butler.....	D.	186	2		Flows.	5				1208
.....do.....	D.	164	2		Flows.	7				1209
.....do.....	D.	165	2		Flows.	7½				1210
.....do.....	D.	165	2		Flows.	7½				1211
.....do.....	D.	167	2		Flows.	7				1212
.....do.....	D.	168	2		Flows.	10				1213
.....do.....	D.	176	2		Flows.	10				1214
.....do.....	D.	226	2		Flows.	5				1215
Sydnor Well and Pump Co.	O.	826	10-8		— 20			1905		1216
W. C. Martin.....	M.	310	10-8	300	+ 24	12	150	1905	2 wells; city supply; very soft water; temperature 64°. (S.)	1217
.....	M.	800	12-6	722	Flows.	25		1902	Salt water at 365 feet; brackish at 722 feet. (L.)	1218
.....	M.	171	6					1903	(L.).....	1219
Sydnor Well and Pump Co.	O.	681	6		— 100		120	1905	Hard. (S.).....	1220

*Summary of well drilling***NORTH DAKOTA**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1221	Water..	Ransom.....	Lisbon, 6 m. W. of.....	Knapp.....	.....
1222	do.....	do.....	Lisbon, $\frac{1}{2}$ m. SW. of post-office.	City of Lisbon.....	.....
1223	do.....	Walsh.....	Adams.....	Jno. Omath.....	.....

OHIO.

1224	.....	Brown.....	Ripley, $1\frac{1}{2}$ m. N. of....	Valentine Sunder..	.....
1225	Oil.....	Columbiana.....	Homeworth, 1 m. W. of, well No. 2 on Burko-witz farm.	.....	.....
1226	do.....	Cuyahoga.....	Cleveland, 4 m. SW. of..	Wm. Kingsley.....	Wm. Kingsley....
1227	Water..	do.....	Gates Mill, $\frac{1}{2}$ m. SE. of..	E. H. Cady.....	Dibble & Ernest..
1228	do.....	do.....	Gates Mill, $\frac{1}{2}$ m. S. of..	Shelden Cary.....	do.....
1229	do.....	do.....	Gates Mill, $\frac{1}{2}$ m. N. of..	R. S. Reynolds.....	do.....
1230	do.....	do.....	Gates Mill.....	Mrs. Willmott.....	do.....
1231	do.....	do.....	Randall, $\frac{1}{2}$ m. W. of....	C. Emery.....	do.....
1232	do.....	do.....	Randall, $\frac{3}{4}$ m. NW. of....	do.....	do.....
1233	do.....	do.....	Randall, $\frac{1}{2}$ m. W. of....	do.....	do.....
1234	do.....	do.....	Randall, $\frac{3}{4}$ m. NW. of, well No. 2.	do.....	do.....
1235	do.....	do.....	South Euclid, 1 m. E. of.	R. E. Smith.....	do.....
1236	Gas.....	Darke.....	Mississinewa Township, Harvey Mote farm, well No. 1.	Ohio and Indiana Cons. N. and I. Gas. Co.	St. Marys Drilling Co.
1238	do.....	Fairfield.....	Berne Township, Hall farm, well No. 1.	Ohio Transporta-tion Line.	do.....
1239	do.....	do.....	Berne Township, N. Keller farm, well No. 1.	do.....	do.....
1240	do.....	do.....	Berne Township, Jacob Leifert farm, well No. 1.	do.....	do.....
1241	do.....	do.....	Brennen, $2\frac{1}{2}$ m. SW. of, sec. 30, T. 16, R. 17, Chas. Leifert farm, well No. 1.	Ohio Fuel Supply Co.	Stretton & Son...
1242	do.....	do.....	Lancaster, 4 m. NE. of, Pleasant Township, No. 1 on J. E. Miller farm.	Ohio Transporta-tion Line.	St. Marys Drilling Co.
1243	Oil.....	Franklin.....	Columbus, 8 m. S. of...	S. B. Hartman.....	.....

reported in 1905—Continued.

NORTH DAKOTA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Phil. Eyre.....	M.	900						1905	(S.).....	1221
do.....		850	3-2	850	+200	75		1905	Water at 60 and 250 feet; quality soft and slightly salty. (L.)	1222
Andrew Steen.....	D.	500						1905	(S.).....	1223

OHIO.

W. L. Beltz.....	D.	842	5½					1905	Dry hole. (L.).....	1224
do.....		802	8¼-4½				a 10	1905	Top of Berea sand at 741 feet. (L.)	1225
Kingsley, Hamden, Rheim, and Rugh.	D.	1,320	8¼-6½					1905	Fresh water at 20 feet; show of oil and some gas at 1,300 feet; gas at 525 feet. (L. S.)	1226
E. Prince.....	C.	150	5½	135	- 15		2½	1905	Water at 46 feet. (L. S.)	1227
do.....	C.	181		181	- 31		½	1905	(L. S.).....	1228
S. Prince.....	C.	134	5½	134	- 84		½	1905	(L.).....	1229
E. Prince.....	C.	127	5½	125	- 3		10	1905	(L.).....	1230
do.....	C.	148	5½	142	- 20		5½	1905	Water at 120 feet. (L.)	1231
do.....	C.	198	5½	180	- 60		4	1905	Slight flow 90-150 feet; more 150-180 feet. (L. S.)	1332
do.....	C.	125						1905	(S.).....	1233
do.....	C.	198	5½	180	- 60		4	1905	(L. S.).....	1234
E. D. Ernest.....	C.	121	5½	120	- 15		24	1904	(L. S.).....	1235
do.....	C.	1,211	8-5½					1904	Top sand at 1,184 feet; light showing of gas.	1236
do.....	C.	2,521	8-5½					1904	First gas (top of sand) at 2,496 feet; yield first 24 hours 1,000,000 cubic feet.	1238
do.....	C.	2,480	8-5½					1904	First gas (top of sand) at 2,451 feet; salt water 200 feet; yield first 24 hours 1,000,000 cubic feet.	1339
do.....	C.	2,410	8-5½					1904	First gas (top of sand) at 2,360 feet; yield of gas first 24 hours 1,000,000 cubic feet.	1240
J. E. Stermer and Wm. Jameson.		2,457	8-5					1905	Gas sand at 2,422-2,457 feet; initial yield 1,000,000 cubic feet. (L. S.)	1241
W. O. Ritz and C. A. Gawas.	D.	2,240	8-5					1905	Hard water at 40-80 feet; alkaline at 560-580; salt at 1,320-1,540 and 1,920-1,940; good flow of gas from Clinton sand. (L. S.)	1242
W. C. Stutlar.....		3,656						1905	Drilling stopped by broken tools. (S.)	1243

a Barrels a day.

Summary of well drilling

OHIO—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1244	Water..	Geauga.....	Auburn, 1 m. W. of....	W. J. Eldridge.....	Dibble & Ernest..
1245	...do...	...do.....	Chesterland, 1½ m. E. of.	Mrs. A. Williams....	...do.....
1246	...do...	...do.....	Ford, 1 m. N. of.....	C. A. Carothers.....	...do.....
1247	...do...	...do.....	Ford, 4 m. N. of.....	E. P. Spalding.....	...do.....
1248	...do...	...do.....	Fullertown.....	Dibble & Ernest.....	...do.....
1249	...do...	...do.....	Middlefield, near post-office.	John Goodin.....	...do.....
1250	...do...	Greene.....	Xenia, 2 m. N. of, well No. 1.	Sarah and Hannah Sexton.	.....
1251	...do...	...do.....	Yellow Springs, well No. 2.	Canning Co.....	.....
1252	...do...	Hancock.....	Arcadia, sec. 12, T. 2, R. 29.	Sherman Huffman..	W. H. Copley.....
1253	Oil.....	...do.....	Findlay, 2½ m. NW. of, well No. 46 on infirm-ary farm.	Genesec Oil Co.....	.....
1254	Gas.....	Hocking.....	Good Hope Township, J. R. Evans farm, well No. 4.	Ohio Transporta-tion Line.	St. Marys Drilling Co.
1255	...do...	...do.....	Laurel Township, Wine farm, well No. 1.	...do.....	...do.....
1256	...do...	...do.....	Rockbridge, 3 m. SW. of, well No. 7 on Chas. Wharton farm.	Springfield Gas Co.	...do.....
1257	.....	Holmes.....	Wilmot, 2½ m. W. of, Paint Township.	E. E. Fox.....	.....
1258	Water..	Jackson.....	Jackson, 5 m. S. of, sec. 15, T. —, R. 18.	Jackson Water Co..	E. A. Floyd & Co.
1259	...do...	...do.....	Jackson, 5 m. S. of, sec. 15, T. 18, R. 6.	...do.....	...do.....
1260	Oil.....	Knox.....	Danville, 2 m. NW. of, SE. corner Brown Township, well No. 1, C. Rice farm.	.....	Forbing Drilling Co.
1261	...do...	...do.....	Howard, 1 m. NE. of, Howard Township, well No. 1, M. Humbert farm.	.....	...do.....
1262	Gas.....	Licking.....	J. B. Jones farm, well No. 1.	Columbus Natural Gas Co.	St. Marys Drilling Co.
1263	...do...	...do.....	Carl I. Price farm, well No. 1.	...do.....	...do.....
1264	.....	Logan.....	Middleburg.....	L. H. Phillips.....	.....
1265	Gas.....	Medina.....	Spencer, 1½ m. W. of, E. A. Firestone farm, well No. 1.	E. A. Firestone....	R. Lambie.....
1266	...do...	...do.....	Spencer, Spencer Town-ship, well No. 1 on J. H. Firestone lot.	J. H. Firestone....	...do.....

a See detailed record at end of table.

reported in 1905—Continued.

OHIO—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
		<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>			
E. Flight.....	C.	120	5 $\frac{3}{8}$	120	.....	6	.....	1905	(L. S.).....	1244
D. A. Colvin.....	C.	140	5 $\frac{3}{8}$	140	-115	.....	4	1905	Soft water. (L. S.)..	1245
Geo. Waite.....	C.	176	.....	176	.....	.....	.....	1904	(L.).....	1246
Ed Flight.....	C.	108 $\frac{1}{2}$	5 $\frac{3}{8}$	105	.....	.....	3	1905	(S. L.).....	1247
.....	C.	105	5 $\frac{3}{8}$	101	+ 18	4	.....	1902	Soft water; medicinal.	1248
D. A. Colvin.....	C.	145	7-5 $\frac{3}{8}$	.....	.....	.....	7	1905	Soft water. (L.).....	1249
David Hughes....	D.	172	5	170	- 70	.....	.....	1905	Hard water.....	1250
.....do.....	D.	135	.....	.....	.....	.....	60	1905	.....	1251
W. H. Copley.....	C.	105 $\frac{1}{2}$	4-3	102	.....	.....	.....	1904	(L. S.).....	1252
McCarthy and Donovan.	M.	1,359	8 $\frac{1}{2}$ -5 $\frac{3}{8}$	.....	.....	.....	6 25	1904	(L. S.).....	1253
.....	C.	2,405	8-5 $\frac{3}{8}$	.....	.....	.....	.....	1904	First gas (top of sand) at 2,378 feet; yield first 24 hours 1,960,-400 cubic feet.	1254
.....	C.	2,444	8-5 $\frac{3}{8}$	.....	.....	.....	.....	1904	First gas (top of sand) at 2,430 feet; yield first 24 hours 1,000,-000 cubic feet.	1255
Duddleson & Derry	D.	2,324	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Fresh water from 175-400 feet; salt water at 660-695, 1,585-1,620, 1,905, and 1,950 feet; show of oil and little gas; 1,250,-000 cubic feet gas at 2,324 feet. (L. S.)	1256
Jacob Von Gunten.	D.	126	.....	.....	Flows.	.....	.....	1899	Test hole. (L.).....	1257
C. Gleason.....	C.	113	8	.....	.....	.....	75	1905	(L. S.).....	1258
.....do.....	C.	140	8	.....	.....	.....	75	1905	(L. S.).....	1259
.....	C.	2,745	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Dry hole; show of oil in Berea sand at 645 feet. (L.)	1260
.....	C.	2,556	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Dry hole; show of oil in Berea sand at 585 feet. (L.)	1261
.....	C.	2,180	8-6 $\frac{3}{8}$	.....	.....	.....	.....	1904	First gas (top of sand) at 2,154 feet; first oil at 2,174 feet; yield first 24 hours 4,131,-000 cubic feet.	1262
.....	C.	2,186	8-6 $\frac{3}{8}$	.....	.....	.....	.....	1904	Top sand at 2,150 feet; no gas obtained.	1263
J. C. Robinson....	D.	237	.....	.....	.....	.....	.....	1905	(S.).....	1264
R. Lambie.....	C.	229	5 $\frac{3}{8}$	.....	.....	.....	.....	1905	Gas at 113 feet; 22 pounds pressure. (L.)	1265
.....do.....	C.	303	5 $\frac{3}{8}$	.....	.....	.....	.....	1905	No gas nor oil. (L. S.)	1266

 $\frac{1}{2}$ Barrels a day.

Summary of well drilling

OHIO—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1267	Oil	Mercer	Jefferson Township, Reservoir farm, well No. 1.	Smith-Neely Oil Co.	Wm. Hamm
1268		Muskingum	Otsego, D. W. Duff farm.	Otsego Oil and Gas Co.	
^a 1269		Noble	Ava, 3 m. W. of	Great Coal Co.	
1270	Oil	Ottawa	Elmore, 1½ m. SW. of, sec. 28.	C. Schott	Lewis Donnels
^a 1271	do	do	Genoa, 2 m. N. of	Leeper Bros.	Rugh & Delo
1272	do	do	Genoa, 2½ m. E. of, well No. 1 on Rothert farm.	Paragon Refining Co.	
1273	Water	Portage	Ravenna, 4 m. NW. of.	Fred Rosinow	Dibble & Ernest
1274	Gas	Richland	Blooming Grove Township, O. F. Wolford farm, well No. 1.	Edna Oil Co.	St. Marys Drilling Co.
1275	Water	do	Mansfield	Mansfield Railway Light and Power Co.	
1276	do	do	do	do	
1277	Oil	Sandusky		L. Gibbs & Co.	
1278	do	do	Fremont, 3 m. W. of, Rerick farm.	F. B. Rollins	
1279	Water	do	Gibsonburg, ½ m. SE. of.	Gibsonburg Corporation.	
1280	do	do	Gibsonburg, ½ m. SW. of.	do	Rust Bros.
^a 1281	Oil	do	Helena, 5 m. NE. of, sec. 35.	Imler, Garn & Co.	
1282	Water	Shelby	Sidney, ½ m. E. of.	Sidney waterworks	Sidney waterworks.
1283	Oil	do	Van Buren Township, Hulsmeier farm, well No. 1.	13 Oil Co.	Wm. Hamm
1284		Stark	Massillon, 2 m. SE. of.	State of Ohio	E. Christman Co.
1285		do	Stawwood, 1 m. W. of, Sugar Creek Township.	Warwick Coal Co.	
1286		do	West Lebanon, 1 m. E. of, Tuscarawas Township.	J. W. Warwick	
^a 1287	Oil	Summit	Akron, 3 m. E. of.	Interstate Oil Co.	James Douglas
1288	do	do	East Akron, 2 m. E. of, Springfield Township, well No. 1 on Brewster farm.	do	do
1289	Water	do	Franklin Township, Peter Soricks farm, NE. ¼ sec. 23.	E. L. Druesey	E. L. Druesey

^a See detailed record at end of table.

reported in 1905—Continued.

OHIO—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	C.	1,174	8-6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Top sand at 1,124 feet; first oil at 1,154 feet; salt water at 1,154 feet; light showing of oil; bridged by shot.	1267
McLaughlin Bros.	D.	1,240	.....	.....	.....	.....	.....	1905	(S.).....	1268
Jacob Von Gunten.	D.	390	2	.....	-360	.....	.....	1904	(L.):.....	1269
.....	.....	1,271	8 $\frac{1}{2}$ -5 $\frac{1}{8}$	.....	.....	b 40	.....	1905	Hard water from 80-110 and 320-350 feet.	1270
Rugh & Hamerley.	C.	1,350	10-8	.....	.....	b 76	.....	1905	Water from 35-480 feet. (L. S.)	1271
H. F. Rugh	D.	1,298	6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Fresh water from surface to 446 feet; salt water at 1,298 feet; no oil. (L. S.)	1272
E. Flight	C.	109	4 $\frac{1}{2}$	108	- 38	.....	3	1905	(L. S.).....	1273
.....	C.	2,360	10-6 $\frac{1}{8}$	.....	.....	.....	.....	1904	Top sand at 2,268 feet; 30 feet thick; poor.	1274
F. F. Copeland	M.	138	.....	.....	.....	.....	.....	1905	(S.).....	1275
A. F. Kenny	O.	175	8	85	- 10	.....	.....	1905	Soft water. (L.).....	1276
E. W. Carothers	D.	1,647	.....	.....	.....	.....	.....	1905	(S.).....	1277
Jno. Dall	M.	470	.....	.....	.....	.....	.....	1905	(S.).....	1278
A. B. Hughes	M.	310	10	140	- 12	.....	160	1901	Hard water, city supply; used by railroad.	1279
Peter A. Rust	M.	290	10	145	.....	.....	80	1897	.....	1280
Imler & Foster	O.	1,377	10-6	.....	.....	.....	b 5	1905	Oil at 1,337-1,345 feet; salt water at 1,365 feet. (L. S.)	1281
.....	O.	118	8	100	+ 16	260	375	1895	Hard iron-bearing water; city supply.	1282
.....	M.	1,252	8-6 $\frac{1}{2}$	.....	.....	.....	b 7	1904	Top of sand at 1,190 feet; first gas at 1,212 feet; first oil at 1,212 feet.	1283
.....	C.	772	8-5 $\frac{1}{8}$	220	.....	.....	200	.....	Salt water and gas at 770 feet; water at 160 and 220 feet.	1284
Jacob Von Gunten.	D.	125	.....	.....	Flows.	.....	.....	1897	Hard sulphur water. Test hole for coal. (L.)	1285
do	D.	145	2	.....	- 3	.....	.....	1905	(L.).....	1286
S. A. Mortimer, W. Wallace.	C.	3,789	10-6 $\frac{1}{8}$	.....	.....	.....	.....	1905	Little oil, with gas and water, at 3,480 feet. (L.)	1287
J. T. Douglas, McConnell.	C.	2,591	8 $\frac{1}{2}$ -6 $\frac{1}{8}$	.....	.....	.....	.....	1905	Surface water to 140 feet; salt water at 2,435 feet; oil sand at 2,568-2,579 feet; dry hole. (L. S.)	1288
E. L. Drusey	O.	200	.....	.....	.....	.....	.....	1905	(S.).....	1289

b Barrels a day.

*Summary of well drilling***OHIO**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1290	Oil.....	Tuscarawas.....	Zoar, 800 feet E. of post-office, John Bimeler farm, well No. 1.	Zoar Oil Co.....	H. H. McKinney.
a1297	Gas.....	Wayne.....	Creston, $\frac{1}{2}$ m. N. of, well No. 1, Martin Cole farm.	Martin E. Cole.....	R. Lambie.....
1298	Water.....	do.....	West Lebanon, 1 m. N. of, Sugar Creek Township.	Andrew Hofaen.....	.....
1299	Oil.....	do.....	Wooster, sec. 3, T. 15, R. 13.	J. W. Stager.....	H. B. Odenkirk...
1300	do.....	Wood.....	Bloomdale, 3 m. E. of, sec. 32, Beaver farm, well No. 3.	Test Oil Co.....	Test Oil Co.....
1301	.....	do.....	Bloomdale, 3 m. E. of, sec. 32.	do.....	do.....
1302	Oil.....	do.....	Bloomdale, $2\frac{1}{2}$ m. E. of, South Lima district, test hole No. 3.	do.....	A. J. Walker.....
1303	Water.....	do.....	Longley, sec. 11, T. 3, R. 126.	Eli Cline.....	W. H. Copley.....
1304	Oil.....	do.....	Ross Township, well No. 81, river tract.	Rossford Oil and Gas Co.	.....

OKLAHOMA.

1305	Water..	Beaver.....	Mineral, 6 m. E. of, sec. 1, T. 4, R. 2.	J. R. Hughes.....	H. E. Thompson..
1306	do.....	Cleveland.....	Norman.....	Mill and Elevator Co.	Fisher & Teeter..
1306a	do.....	Dewey.....	Aledo, $2\frac{1}{2}$ m. E. of, sec. 31, T. 16, R. 19.	W. L. Seago.....	.....
1307	do.....	do.....	Oakwood, $2\frac{1}{2}$ m. NE. of..	James Latin.....	.....
1308	do.....	do.....	Oakwood, $\frac{1}{2}$ m. NE. of...	J. A. Pearce.....	.....
1309	do.....	do.....	Raymond, 3 m. NE. of..	Robt. Gatiway.....	.....
1310	Oil.....	Greer.....	Granite.....	C. H. Myen.....	.....
1311	Water..	Oklahoma.....	Oklahoma, $\frac{1}{4}$ m. NE. of..	John Threadgill...	.....
1312	Oil.....	do.....	Spencer, $\frac{1}{8}$ m. SW. of...	Citizens Oil and Gas Co.	.....
1313	do.....	Osage.....	Sec. 25, T. 26.....	Barney Oil Co.....	.....
1314	do.....	Pawnee.....	Cleveland, 1 m. SW. of, well No. 5, Murphy farm.	W. C. Kennedy Co..	G. W. Sparks....

^a See detailed record at end of table.

reported in 1905—Continued.

OHIO—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	C.	<i>Ft.</i> 795	<i>In.</i> 8-6 $\frac{1}{2}$	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>	1905	Salt water at 790 feet; no oil or gas. (L.)	1290
R. Lambie	C.	512	8-6					1905	(L. S.)	1297
Jacob Von Gunten	D.	125	3		26			1901	Hard. (L.)	1298
Dan Smith	C.	3,280	6-4 $\frac{3}{4}$					1903	(L. S.)	1299
A. J. Walker	D.	1,700	8-5 $\frac{3}{4}$					1905	Drilling suspended; show of gas and oil at 1,170, 1,290, and 1,381 feet. (L.)	1300
do.	D.	1,871						1905	No water below 350 feet; no gas below 1,190 feet; oil not in paying quantity. (L. S.)	1301
A. J. Walker and Y. Hasson.	C.	1,173	10-8 $\frac{1}{2}$				5-10	1905	Water at 295-345 feet. (L. S.)	1302
W. H. Copley	C.	106	4 $\frac{1}{2}$	106				1904	(L. S.)	1303
Beas & Wolfe	O.	1,335						1905	(L. S.)	1304

OKLAHOMA.

H. E. Thompson	C.	148	5 $\frac{1}{2}$	130	42		10	1905	Water at 22 and 90 feet.	1305
B. F. Teeter	D.	250	8-7	245	70				(L.)	1306
Frank Clark	O.	190	6	65	55			1903	Gypsum water. (L.)	1306a
Ira T. Smith	D.	202	6	176	176			1904	Soft water.	1307
do.	D.	190	6	175	175			1904	Soft water. (L.)	1308
Chas. A. Clark		166	6	166	95			1902	Hard water.	1309
P. J. Stacey	D.	2,015						1905	Bituminous sandstone at 1,985 feet. (S.)	1310
Billings Bros.	O.	169	6	160	80		50	1905	Pockets of oil at 118 and 135 feet; water soft.	1311
Joe Henick	M.	2,000						1905	(S.)	1312
Patton & Ryan	D.	1,535						1905	(S.)	1313
Harry Doyle and Charley Jones.	C.	1,809	13-6 $\frac{3}{4}$			10		1905	Salt water at 280-750 feet; gas at 1,700 and 1,724 feet; oil sand at 1,758 feet. (L. S.)	1314

b Barrels a day.

Summary of well drilling

OKLAHOMA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1315	Oil.....	Pawnee.....	Cleveland, 6 m. SE. of, sec. 2, T. 21, R. 8, well No. 2 on D. B. Layton farm, Layton district.	C. C. Nelson.....	J. M. Clover.....
1316	.....do.....	.....do.....	Cleveland, Missouri, Kansas and Texas R. right of way, on Burton farm.	J. B. Showalter....	G. W. Sparks.....
1317	.....do.....	.....do.....	Cleveland, 3 m. S. of, well No. 1, Perry Sewell farm.	J. W. Sloan.....	.....do.....
1318	.....do.....	.....do.....	Cleveland, on C. D. Law farm.	.....	West Virginia Drilling Co.
1319	.....do.....	Payne.....	Yale, near post-office...	Wilderman & Co....	Stephenson & Bishop.
1320	Water..	Washita.....	Rocky, $\frac{4}{5}$ m. NW. of, sec. 9, T. 8, R. 18.	Geo. W. Jones.....	.....
1321	.....	.....do.....	Rocky, 2 m. N. of.....	Wm. W. Long.....	.....
1322	.....	Woodward.....	Charleston, 7 m. W. of, sec. 15, T. 27, R. 22.	John Saunders.....	.....
1323	Water..	.....do.....	Heman, 3 m. N. of, sec. 1, T. 24, R. 17.	John Gouss.....	.....

OREGON.

1324	Water..	Gilliam.....	Condon.....	S. B. Barker.....	E. G. Palmer.....
1324a	.....	.....do.....	Condon, $\frac{1}{2}$ m. N. of.....	City of Condon.....	J. W. Newmaker.....
1324b	Water..	.....do.....	.....do.....	J. W. Newmaker.....	.....
1324c	.....do.....	.....do.....	Mayville, 7 m. NW. of, T. 5, R. 21.	Sam McGillivray....	.....
1324d	.....do.....	.....do.....	Mayville, 9 m. NW. of, T. 5, R. 20.	Ed Morgan.....	.....
1324e	.....do.....	.....do.....	Mayville, 11 m. NW. of, T. 5, R. 20.	J. C. Webb.....	.....
1325	.....do.....	.....do.....	Mayville, $2\frac{1}{2}$ m. NW. of, T. 5, R. 21.	Hill & Haley.....	J. W. Newmaker.....
1326	.....do.....	.....do.....	Mayville, $2\frac{1}{2}$ m. NE. of, T. 5, R. 19.	George B. Dukek.....	.....do.....
1327	.....do.....	.....do.....	Mayville.....	E. Morgan.....	.....
1328	.....do.....	Klickitat.....	Goldendale, 8 m. E. of..	Frank Fenton.....	P. H. Kretzer.....
1329do.....	Malheur.....	Ontario, $\frac{1}{2}$ m. S. of.....	A. F. Boyer.....

^a See detailed record at end of table.

SUMMARY OF DRILLING.

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reported in 1905—Continued.

OKLAHOMA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
W. E. Meer.....	C.	2,100	8 $\frac{1}{2}$ -6 $\frac{1}{4}$	.....	.....	640	.....	1905	Fresh water at 40 feet; salt at 500 feet; none below; gas at 1,130 feet; oil at 1,160 feet; show of oil and gas at 1,820 and 2,000 feet; yields 1,000,000 cubic feet of gas.	1315
.....	C.	1,636	13-5 $\frac{3}{16}$	.....	.....	.....	.....	1905	Cleveland oil sand at 1,612 feet; salt water at 580 and 1,626 feet; slight show of oil; abandoned.	1316
Jack Smith and Al. Harttine.	C.	1,903	13-6 $\frac{3}{8}$	.....	.....	.....	.....	1905	Dry hole; fresh water at 50 feet; salt water at 280, 925, 1,890 feet. (L. S.)	1317
.....	C.	2,450	10-6 $\frac{3}{8}$	.....	.....	.....	.....	1905	Fresh water at 142-182 feet; salt at 420-440 and 1,870-1,900 feet; show of oil and gas at 2,210 feet; tools lost; well abandoned. (L.)	1318
Hagen and Cauf-field.	C.	1,010	18	.....	.....	.....	.....	1905	Unfinished; water at 240-275 feet; salt water at 310-380, 580-605, 605-630, 870-880, and 970-1,010 feet. (L. S.)	1319
Lee Shivley.....	O.	225	6	200	- 75	.....	5	1899	Hard water.....	1320
.....	O.	185	6-4	180	.....	.....	Small	.....	.....do.....	1321
William Beasley...	D.	181	6 $\frac{1}{2}$	181	.....	.....	.....	1905	Salt, not used; pocket of gas at 181 feet.	1322
.....	M.	110	.....	.....	.....	.....	.....	1905	Hard, salty water....	1323

OREGON.

E. G. Palmer.....	C.	199	6	179	-164	.....	8	1905	(L. S.).....	1324
J. W. Newmaker...	C.	524	8	400	-150	.....	72	.....	.....	1324a
.....do.....	O.	524	8	400	-150	.....	20	1905	Alkaline water; city supply.	1324b
Ed. G. Palmer.....	D.	181	5 $\frac{5}{8}$	178	-121	.....	8	1905	Soft water.....	1324c
.....do.....	D.	363	5 $\frac{5}{8}$	361	-273	.....	6	1905	Water at 20, 180, and 270 feet; soft.	1324d
.....do.....	D.	267	5 $\frac{5}{8}$	266	-240	.....	4 $\frac{1}{2}$	1905	Soft water.....	1324e
.....do.....	C.	110	6	65	- 35	.....	9	1905	(L. S.).....	1325
.....do.....	C.	277	5 $\frac{5}{8}$	.....	.....	.....	.....	.....	(L. S.).....	1326
.....do.....	D.	363	.....	.....	.....	.....	.....	1905	(S.).....	1327
P. H. Kretzer.....	C.	175	4 $\frac{1}{16}$	.....	.....	.....	.....	1905	(L. S.).....	1328
Ed. Ashley.....	.....	215	3	168	Flows.	.....	.....	1902	Soft; well also yields gas. (L.)	1329

^b Barrels a day.

*Summary of well drilling***OREGON**—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1330	Water..	Morrow.....	Castle Rock, sec. 8, T. 4, R. 24.	M. T. Cochran.....	.....
1331	...do...	...do.....	Castle Rock.....	L. M. Gaines.....	M. T. Cochran....
1332	...do...	...do.....	Lexington, 5 m. W. of..	Frank Mason.....	.....
1333	...do...	...do.....	Ione, 15 m. SW. of....	H. O. Olden.....	Nat Gray.....
1334	...do...	Wasco.....	The Dalles.....	J. M. Russell.....	.....

PENNSYLVANIA.

1335	Water..	Adams.....	Gettysburg, Cemetery Hill.	Gettysburg Water Co.	.....
a1336	Gas.....	Armstrong.....	Parks Township, Geo. W. Parker farm.	United Natural Gas Co.	.....
1337	Oil.....	Butler.....	Butler, 5 m. NE. of, well No. 1, on W. M. Wick farm.	Oakland Oil and Gas Co.	C. H. Parker.....
1338	Gas.....	Clarion.....	Ritts farm.....	Clarion Gas Co.	.....
1339	...do...	Greene.....	Aleppo Township, M. L. Pethel, No. 1.	.....	.....
1340	...do...	...do.....	Cameron, W. Va., 3 m. E. of, Aleppo Township, well No. 1, on Benson heirs' farm.	Wheeling Gas Co...	G. W. Burns.....
1341	Oil.....	...do.....	Center Township, No. 2, Milliken farm.	South Pennsylvania Oil Co.	.....
1342	...do...	...do.....	Higbee, A. Grim farm, well No. 1.	...do.....	Largie Bros.....
1343	Gas.....	...do.....	Higbee, 1½ m. SE. of, Harkins heirs' farm, well No. 2.	...do.....	R. D. Mead.....
1344	Oil.....	...do.....	Morris Township, John Smith farm, well No. 3.	Nineveh Petroleum Co.	.....
a1345	...do...	...do.....	Waynesburg, 6 m. S of, H. M. Spragg farm, well No. 1.	South Pennsylvania Oil Co.	.....
1346	Gas.....	...do.....	Springhill Township, Richard Pethel, No. 1.	.....	.....
1347	...do...	...do.....	Springhill Township, well No. 1565, on John Null No. 1 farm.	Philadelphia Co...	Cochran & Funk..
1348	...do...	...do.....	Waynesburg, 7 m. N. of.	Carnegie Gas Co.	.....
1349	Water..	Lackawanna.....	Archibald, Moosic Mountain.	Andrew Arnold.....	.....

a See detailed record at end of table.

reported in 1905—Continued.

OREGON—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
W. E. Thomas....	D.	<i>Ft.</i> 173	<i>In.</i> 6½-4½	<i>Ft.</i> 153	<i>Ft.</i> -12	<i>Gals.</i>	<i>Gals.</i>	1905	Water at 40, 120, and 153 feet; abandoned on account of quicksand. (L. S.)	1330
.....do.....	D.	395	7-5½	.....	.....	.....	.....	1905	Water at 47, 160, 265, and 328 feet. (L. S.)	1331
Nat Gray.....	D.	110	.....	.....	.....	.....	.....	1905	(S.).....	1332
.....do.....	C.	201	6½	155	.....	.....	.....	1905	Abundance of water. (L. S.)	1333
P. S. Kretzer.....	D.	117	7-4½	115	- 9	.....	33½	1900	Soft. (L.).....	1334

PENNSYLVANIA.

.....	O.	265	.....	.....	.....	.....	.....	.....	(S.).....	1335
.....	M.	2,812	.....	.....	.....	.....	.....	1905	Gas at 2,018 feet; yield, after shooting, 130,000 cubic feet in 24 hours. (L.)	1336
Harry Patterson and Ed Culbertson.	O.	1,190	6½	1,185	.....	.....	6 12	1904	Fresh water above 96 feet; oil and gas at 1,185-1,190 feet; produced 12 barrels of oil a day at end of 5 months; salt water and oil at 1,120-1,140 feet. (L. S.)	1337
W. E. Boyer.....	O.	3,055	.....	.....	.....	.....	.....	1905	(S.).....	1338
.....	M.	3,071	.....	.....	.....	.....	.....	1901	Strong gas at 2,280 and 3,003 feet.	1339
T. W. Atkins.....	D.	5,322	13-6½	.....	.....	.....	.....	1905	Hole plugged by cable breaking; second deepest well in United States. (L.)	1340
.....	M.	3,320	.....	.....	.....	.....	.....	1892	Very little oil; abandoned. (L.)	1341
W. W. Reed and J. P. Orvin.	M.	3,077	13-5	.....	.....	.....	6 125	1900	First oil at 3,061-3,064 feet; second oil at 3,067-3,074 feet. (L.)	1342
W. W. Reed and B. Coleman.	M.	3,362	10-5	3,345	.....	.....	.....	1904	Pressure, 300 pounds. (L.)	1343
.....	M.	3,045	.....	.....	.....	.....	.....	1888	(L.).....	1344
.....	M.	3,215½	.....	.....	.....	.....	.....	1895	Dry hole. (L.).....	1345
.....	M.	3,234	.....	.....	.....	.....	.....	1904	Rock pressure, 1,000 pounds. (L.)	1346
E. L. & M. R. Mohr.	D.	3,590	.....	.....	.....	.....	.....	1905	(L. S.).....	1347
.....	.....	3,050	.....	.....	.....	.....	.....	1905	(S.).....	1348
H. Lawton & Sons.	D.	146	.....	.....	.....	.....	.....	1905	(S.).....	1349

6 Barrels a day.

Summary of well drilling

PENNSYLVANIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1350	Gas.....	Lycoming.....	Slate Run, $\frac{1}{4}$ m. W. of, well No. 1, on J. B. Tomb farm.	Tidewater Pipe Co..	Thos. W. Bell....
1351	...do.....	...do.....	...do.....	...do.....	...do.....
1352	...do.....	...do.....	Slate Run, $1\frac{1}{2}$ m. SW. of.	...do.....	...do.....
1353	Water..	Northampton...	South Bethlehem, 1 m. SW. of.	Lehigh Valley Silk Mills.	E. C. Bast.....
1354	.....	Potter.....	Genesee Township.....	O'Donnell & Cobb..	.....
a1355	Oil.....	Somerset.....	Pocahontas, 1 m. N. of.	Piney Run Oil and Gas Co.	.....
1356	Water..	Susquehanna....	Kingsley, $1\frac{1}{2}$ m. NE. of.	W. Jefferson.....	.....
1357	...do.....	...do.....	Montrose, $\frac{1}{4}$ m. NE. of.	Delaware, Lackawanna and Western R. R.	.....
1358	Oil.....	Tioga.....	Lambs Creek.....	Blossburg Co.....	.....
1358a	...do.....	...do.....	Potter Brook, 1 m. S. of J. Little farm, well No. 1.	Potter Brook Oil and Gas Co.	.....
1358b	...do.....	Venango.....	Emlenton, 5 m. W. of S. S. Jolly farm, well No. 11.	Bean & Co.....	J. S. Bean.....
1359	...do.....	Warren.....	Eldred Township, lot 346, Parker farm, No. 3.	Reno Oil Co.....	J. G. Winger....
1360	...do.....	...do.....	Eldred Township, lot 346, Parker farm, No. 2.	...do.....	...do.....
1361	...do.....	...do.....	Eldred Township, tract No. 346, Parker farm, No. 1.	...do.....	...do.....
1362	...do.....	...do.....	Eldred Township, Levi Pierce farm, well No. 1.	Stanton Oil Co....	...do.....
1363	...do.....	...do.....	Eldred Township, lot 347, Reno No. 1.	...do.....	...do.....

a See detailed record at end of table.

reported in 1905—Continued.

PENNSYLVANIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
		<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>			
T. W. Bell and Phillip Kleckner.	O.	2,503	6 $\frac{1}{2}$	.....	.....	.....	.....	1905	Salt water at 476, 506, 548, 680, 1,049, and 1,155 feet; gas at 1,142 feet; pressure, 910 pounds; hole dry below 1,155 feet. (L. S.)	1350
.....do.....	O.	1,155 $\frac{1}{2}$	6 $\frac{1}{2}$	.....	.....	.....	.....	1905	No fresh water below 350 feet; flood of salt water at 548-560 feet; 130,000 feet per day; initial pressure, 910 pounds. (L. S.)	1351
S. O'Donnell and W. Davidson.	O.	1,313	.....	.....	.....	.....	.....	1905	Fresh water at 120-140 feet; salt water at 575-600 feet; no gas nor oil.	1352
E. C. Bast.....	C.	300	9-8	268	-62	.....	100	1905	Water at 90-150, 200-300 feet. (L. S.)	1353
.....do.....	M.	1,890	.....	.....	.....	.....	.....	1905	(S.).....	1354
John V. Wilcox....	O.	1,646	8-6 $\frac{1}{2}$	140	- 5	.....	.....	1904	Show of oil at 1,050, 1,150, and 1,640 feet. (L. S.)	1355
H. Lawton & Sons.	D.	270	.....	.....	.....	.....	.....	1905	(S.).....	1356
John Muirhead & Son.	M.	316	8	.....	.....	.....	.....	1905	(L.).....	1357
.....do.....	.....	1,195	.....	.....	.....	.....	.....	1905	Fresh-water stratum at 395-435 feet; salt water at 522-568, 753-815 feet; oil showing at 1,020-1,050, 1,110-1,120 feet. (L. S.)	1358
W. C. Shear.....	D.	1,248	6 $\frac{1}{2}$	.....	.....	.....	.....	1904	Dry hole. (L.).....	1358a
Bean & Dougherty	C.	1,111	5 $\frac{1}{2}$	.....	.....	.....	b 2	1905	(L. S.).....	1358b
J. G. Winger.....	C.	450	5 $\frac{1}{2}$	.....	.....	.....	b 2	1886	Salt water, oil, and gas at 205-245 feet; salt water filled hole to 100 feet of top; some oil at 435-450 feet; abandoned. (L.)	1359
.....do.....	C.	730	5 $\frac{1}{2}$	520	.....	.....	b 30	1886	Produced oil for 14 years.	1360
.....do.....	C.	835	5 $\frac{1}{2}$	.....	.....	.....	.....	1886	Show of oil at 270-300 and 500-515 feet; well abandoned.	1361
.....do.....	C.	483	8-5 $\frac{1}{2}$	450	.....	.....	b 3	.....	Salt water at 418-448 feet; gas sand at 448-450 feet; oil sand at 450-454, 462-465 feet. (L. S.)	1362
.....do.....	C.	400	5 $\frac{1}{2}$	.....	.....	.....	.....	1889	Gas, oil, and water at 105-150, 240-284, 320-333 feet; black sulphur water; fresh water to 5 feet of top; dry holes. (L.)	1363

b Barrels a day.

Summary of well drilling

PENNSYLVANIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1364	Oil.....	Warren.....	Eldred Township, Reno farm, well No. 2.	Stanton Oil Co.....	J. G. Winger.....
1365	do.....	do.....	Eldred Township, Reno farm, well No. 1	do.....	do.....
1366	Gas.....	do.....	Eldred Township, Smith farm well No. 3.	do.....	do.....
1367	Oil.....	do.....	Eldred Township, lot 147, John J. White farm, No. 2.	John J. White.....	do.....
1368	do.....	do.....	Eldred Township, lot 147, John J. White farm, No. 1.	do.....	do.....
a1369	Gas.....	do.....	Eldred Township, Zane farm, No. 1.	Stanton Oil Co.....	Elijah Meals.....
1370	Oil.....	do.....	Grand Valley, $\frac{7}{8}$ m. SE. of.	do.....	J. G. Winger.....
a1371	do.....	do.....	Grand Valley, 1 m. SE. of.	do.....	do.....
1372	do.....	do.....	Grand Valley, 1 m. SE. of, Eldred Township, well No. 17, on Dunderdale farm.	do.....	do.....
1373	do.....	do.....	Eldred Township, Culver land, well No. 5.	do.....	do.....
1374	do.....	do.....	Eldred Township, Culver land, well No. 3.	do.....	do.....
1375	do.....	do.....	Eldred Township, Dunderdale farm, well No. 6.	do.....	do.....
1376	do.....	do.....	Eldred Township, Dunderdale farm, well No. 10.	do.....	do.....
1377	do.....	do.....	Eldred Township, Ellis farm, well No. 2.	do.....	J. G. Winger.....

a See detailed record at end of table.

reported in 1905—Continued.

PENNSYLVANIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. G. Winger.....	C.	498	5½	478			b 12	1889	(L. S.).....	1364
.....do.....	C.	549	8-5½				b 20	1889	Fresh water at 50-100 feet. (L. S.)	1365
.....do.....	C.	668	5½	50				1889	Water at 50-200 feet; oil at 658-663 feet; gas pressure, 45 pounds; gas yield, 20,000 feet. (L.)	1366
.....do.....	C.	515	5½				b 5	1894	Water and show of oil at 270-300 feet; oil, gas, and salt water at 500-515 feet. (L.)	1367
.....do.....	C.	453	5½	440			b 32	1894	Water at 50-100 feet; show of oil at 210-250 feet. (L.)	1368
Sylvanius Winger.	M.	1,359	5½					1888	Small show of salt water and gas at 411-459 feet; gas at 646-659 feet; oil at 649-655 feet; yield, 60,000 feet. (L. S.)	1369
J. O. Winger.....	C.	580	16-5½	90	-90	b 12½		1905	Fresh water at 100-120 feet; salt water at 528-536 feet; oil and gas at 528½-536 feet. (L. S.)	1370
.....do.....	C.	609½	16-8				b 11½	1905	Fresh water at 80 feet, which falls to 160 feet; salt water at 557 feet; oil and gas at 551-554 feet. (L. S.)	1371
.....do.....	C.	529	16-5½					1905	Fresh water at 25-100 feet; oil sand at 460-475 and 499-503 feet; salt water at 480-491 feet. (L. S.)	1372
J. O. Winger and J. J. Winger.	C.	595	5½					1900	Slight show of oil, water, and gas at 317-327, 523-538 feet; slight show of oil at 565-576 feet; abandoned. (L.)	1373
.....do.....	C.	779	5½				b 8	1899	Water at 80-250 feet; little oil, gas, and salt water at 475-501 feet; oil and some gas at 709-720 feet. (L.)	1374
.....do.....	M.	504	5½				b 10	1880	Abandoned. (L.)....	1375
.....do.....	M.	572	5½				b 3	1885	Oil at 514-522 feet....	1376
J. G. Winger.....	C.	422	5½	385			b 8	1887	Gas and salt water filling well to 50 feet of top at 348-357 feet; salt water at 360-379 feet; good showing of oil at 385-408 feet; well abandoned. (L., S.)	1377

b Barrels a day.

Summary of well drilling

PENNSYLVANIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1378	Oil.....	Warren.....	Eldred Township, Jackson farm, well No. 10.	Stanton Oil Co.....	.....
1379	.....do.....	.....do.....	Eldred Township, Lamarie lot, well No. 7.	.....do.....	J. G. Winger.....
1380	.....do.....	.....do.....	Eldred Township, Lamarie lot, well No. 9.	.....do.....	.....do.....
1381	.....do.....	.....do.....	Eldred Township, Lamarie lot, well No. 13.	.....do.....	.....do.....
1382	.....do.....	.....do.....	Eldred Township, lot 346, Parker farm, No. 7.	Haselhine & Stone.....	.....do.....
1383	.....do.....	.....do.....	Eldred Township, lot 346, Parker farm, No. 6.	A. M. Parker.....	.....do.....
1384	.....do.....	.....do.....	Eldred Township, lot 346, Parker farm, No. 5.	Reno Oil Co.....	.....do.....
1385	.....do.....	.....do.....	Eldred Township, lot 346, Parker farm, No. 4.	.....do.....	.....do.....
1386	.....do.....	.....do.....	Grand Valley, 2½ m. NE. of, Eldred Township, Ellis farm.	Stanton Oil Co.....	.....do.....
1387	.....do.....	.....do.....	Grand Valley, 1½ m. SE. of, Motz farm, well No. 1.	Stanton.....	Dunderdale Oil Co.
1388	.....do.....	.....do.....	Grand Valley, 1 m. SE. of, Grandon farm, well No. 1.	Stanton Oil Co.....	.....
1389	.....do.....	.....do.....	Grand Valley, 1 m. E. of, well No. 6, 1½ m. SW. of Newton pool.	Thomas & Grant...	J. G. Winger.....
1390	.....do.....	.....do.....	Triumph Township, Smutz farm, well No. 1.	Huntington & Herbert.	.....do.....
1391	.....do.....	.....do.....	Southwest Township, Hindcooper farm, well No. 1.	Stanton Oil Co.....	Charles Lee.....

reported in 1905—Continued.

PENNSYLVANIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	M.	800	5 $\frac{1}{8}$				a 12	1890	(L.)	1378
J. O. Winger and J. G. Winger.	C.	790	5 $\frac{1}{8}$	764			a 10	1899	Show of oil, gas, and salt water at 292-498 feet; salt water at 748-760 feet; oil at 764-775 feet. (L.)	1379
J. O. Winger.	C.	803	5 $\frac{1}{8}$				a 8	1899	Little gas, oil, and salt water at 537-587 feet; slight show of oil at 771-782 feet; liberal show of oil at 790-800 feet. (L.)	1380
.....do.....	C.	828	5 $\frac{1}{8}$				a 3	1899	Salt water at 335 feet; liberal show of oil at 818-828 feet. (L.)	1381
J. G. Winger.		560	5 $\frac{1}{8}$				a 3	1889	Show of oil at 280-320 feet; show of oil at 525-539 feet; abandoned. (L.)	1382
.....do.....	C.	515	5 $\frac{1}{8}$	500			a 15	1888	Slight show of oil and gas at 287-297 feet. (L.)	1383
.....do.....	C.	540	5 $\frac{1}{8}$	512			a 5	1886	(L.)	1384
.....do.....	C.	562	5 $\frac{1}{8}$					1886	Showing of oil at 530-542 feet; abandoned. (L.)	1385
J. O. Winger.	C.	420 $\frac{1}{2}$	8-6				a 1 $\frac{1}{2}$	1905	Fresh water from 50-170 and at 345 feet; salt water at 368-376 feet; oil at 50-60 $\frac{1}{2}$ and at 378 feet. (L., S.)	1386
.....do.....	M.	524	5 $\frac{1}{8}$				a 3	1883	Oil and gas at 465 feet; yield after shooting, 10 barrels per 24 hours. (L.)	1387
.....do.....	M.	547 $\frac{1}{2}$	5 $\frac{1}{8}$				a 2 $\frac{1}{2}$	1879	Oil and salt water at 492 feet; well did 10 barrels per day for 263 days after shooting. (L.)	1388
J. O. Winger and H. H. Winger.	C.	659	8				a 24	1905	Fresh water at 100-170 feet; about 24 gallons per minute; oil at 606-622 feet; gas at 593 and 637 feet. (L., S.)	1389
J. O. Winger.	C.	610	5 $\frac{1}{8}$	80				1897	Water containing sulphur and iron at 50 feet; flows 10 gallons per minute; slight show of oil at 550-565 and 575-585 feet; yield, 10 gallons first 13 hours. (L.)	1390
.....do.....		735	8-5 $\frac{1}{8}$					1888	Oil sand at 700-706 feet; salt water at 706-715 feet; oil sand pay at 715-725 feet. (L., S.)	1391

a Barrels a day.

Summary of well drilling

PENNSYLVANIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1392	Oil.....	Warren.....	Southwest Township, Gibbs farm, well No. 4.	Stanton Oil Co.....	Elijah Mealy
1393	...do.....	...do.....	Southwest Township, Campbell farm, well No. 5.	...do.....	Charles Lee.....
1394	Gas.....	...do.....	Southwest Township, lot 134.	Ralston & Benedict.....	.....
1395	Oil.....	...do.....	Southwest Township, Hindecooper farm, well No. 1.	Stanton Oil Co.....	Charles Lee.....
1396	...do.....	...do.....	Southwest Township, Geo. Wales farm, well No. 15.	...do.....	.....
1397	...do.....	...do.....	Southwest Township, S. H. Fisher farm, well No. 2.	...do.....	E. Mealy.....
a1398	...do.....	...do.....	Warren.....	F. B. Jackson.....	.....
1401	Water.....	...do.....	Seneca, 2 m. W. of.....	Diamond Bros.....	.....
1402	Oil.....	...do.....	Deerfield Township, Rhinehart farm.	Stanton Oil Co.....	J. G. Winger.....
1403	...do.....	...do.....	Eldred Township, Adams farm, well No. 9.	...do.....	...do.....
1404	...do.....	...do.....	Eldred Township, John Ellis farm, well No. 6.	...do.....	...do.....
1405	...do.....	...do.....	Eldred Township, Adams farm, well No. 11.	...do.....	...do.....
1406	...do.....	...do.....	Eldred Township, Brown farm, No. 5.	Archibald T. Scofield.....	...do.....
1407	...do.....	...do.....	Eldred Township, Brown farm, No. 2.	Archibald T. Scofield.....	...do.....
1408	...do.....	...do.....	Eldred Township, lot No. 193, Brown farm, No. 1.	...do.....	...do.....
1409	...do.....	...do.....	Eldred Township, Cartright farm, Reno No. 1.	Stanton Oil Co.....	...do.....

a See detailed record at end of table.

reported in 1905—Continued.

PENNSYLVANIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	M.	839	8-5 $\frac{1}{8}$	830			b 25	1887	Fresh water at 50-200 feet; oil sand at 802-810 feet; salt sand at 810-819 feet; gas sand at 819-824 feet. (L., S.)	1392
	M.	765	5 $\frac{1}{8}$					1886	Oil sand at 703-712 feet; salt water at 712-742 feet. (L., S.)	1393
	M.	840	5 $\frac{1}{8}$						Yield first 24 hours, 110,000 cubic feet; initial pressure, 110 pounds per square inch; 1 of 3 wells which supply borough of Grand Valley. (L.)	1394
	M.	733	5 $\frac{1}{8}$					1888	Oil sand at 700-706 feet; salt water at 706-715 feet; large producer. (L., S.)	1395
	M.	840	5 $\frac{1}{8}$				b 30	1888	Oil sand at 805-815 feet; salt water sand at 815-820 feet; oil 45° B. (L., S.)	1396
	M.	810	5 $\frac{1}{8}$				b 25	1886	Oil at 769-776 feet; salt water at 776-780 feet; oil 45° B. (L., S.)	1397
R. Philo.....	O.	3,670						1905	(S.).....	1398
Diamond Bros.....	O.	275	8-5 $\frac{1}{8}$	200	-200			1895	Iron water.....	1401
J. G. Winger.....	C.	602	5 $\frac{1}{8}$	50				1895	Dry hole. (L. S.)....	1402
J. O. & J. J. Winger	C.	610	6	591			b 25	1900	Show of oil at 218-246 feet. (L.)	1403
J. G. Winger.....	C.	420	5 $\frac{1}{8}$				b 5	1895	Oil sand at 385-403 feet. (L.)	1441
J. O. & J. J. Winger	C.	817	5 $\frac{1}{8}$	774			b 20	1900	Water at 50-200 feet; salt water at 280-290, 745 feet. (L.)	1405
J. O. Winger.....	C.	762	5 $\frac{1}{8}$				b 25	1902	Oil at 689-702 feet; salt water at 702-718 feet. (L.)	1406
.....do.....	C.	754	5 $\frac{1}{8}$	678			b 12	1900	Small showing of oil at 468-476 feet; oil and some gas at 678-693 feet. (L.)	1407
.....do.....	C.	854	5 $\frac{1}{8}$				b 15	1900	Water at 80-219 feet; show of oil, gas, and salt water at 443-473 feet; oil and little gas at 683-696 feet; salt water at 696-712, rose 50 feet. (L.)	1408
J. G. Winger.....	C.	835	5 $\frac{1}{8}$					1887	Trace of oil at 210-240 feet; small amount at 455-465 feet. (L.)	1409

b Barrels a day.

Summary of well drilling

PENNSYLVANIA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1410	Oil	Warren.....	Eldred Township, Crantz farm, No. 2.	Archibald T. Sco- field.	J. G. Winger.....
1411	do	do	Eldred Township, Crantz farm, No. 1.	do	do
1412	do	Washington.....	McMurray	do	Lyle & McCloy ..
1413	do	do	Thomas, $\frac{1}{2}$ m. NW. of ..	Liberty Oil and Gas Co.	do
1414	Gas.....	do	Thomas, $1\frac{1}{2}$ m. N. of ..	do	do
1415	Oil.....	do	Thomas, $2\frac{1}{2}$ m. E. of, E. F. Hyde farm, well No. 1.	do	do
1416	do	do	Thomas, $1\frac{1}{2}$ m. N. of, J. H. McMurray farm.	Liberty Oil Co.....	do
a1416a	do	do	Thomas, $1\frac{1}{2}$ m. N. of, well No. 1 on John R. McMurray farm.	Liberty Oil and Gas Co.	do
1417	do	do	Washington, $3\frac{1}{2}$ m. W. of, Israel Weirich farm, well No. 4.	Willets Oil Co.....	do
1418	Gas.....	Wyoming.....	Lovelton	do	S. P. O'Donnell...

RHODE ISLAND.

1419	Water..	Providence.....	Arlington.....	Narragansett Brewing Co.	Artesian Well and Supply Co.
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SOUTH CAROLINA.

a1420	Water..	Aiken.....	Aiken.....	City of Aiken.....	Perry Andrews...
1421	do	Bamberg.....	Bamberg, NW. of ..	Town of Bamberg..	do
1422	do	do	Bamberg, 500 yards E. of.	Carlyle fitting school.	do
1423	do	do	Bamberg, $\frac{1}{2}$ m. E. of ..	Fulk Brabham & Co.	do
1424	do	do	Ehrhardt.....	E. Ehrhardt & Son.	do

a See detailed record at end of table.

reported in 1905—Continued.

PENNSYLVANIA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. O. Winger.....	C.	698	5 $\frac{1}{8}$	.....	.....	.....	10	1892	Water strata at 60-116 feet; small showing of gas at 643-650 feet; oil at 650-665 feet; abandoned after 6 months' pumping. (L.)	1410
J. G. Winger.....	C.	698 $\frac{1}{2}$	5 $\frac{1}{8}$	.....	.....	.....	b 10	1902	Fresh water at 50-180 feet; salt water at 661-674, rose 60 feet; showing of oil at 653-661 and 674-685 feet. (L.)	1411
McCloy & Rowlee .	O.	2,505	13-0 $\frac{1}{8}$	.....	.....	.....	.....	1905	Fresh water at 15, 45, and 800 feet; salt water from 1,155-1,170 feet; gas at 1,470 feet; show of oil at 2,130 feet. (L. S.)	1412
Lyle & McCloy....	D.	2,262	.....	2,235	.....	.....	.....	1905	Water at 60, 620, and 1,325 feet; gas at 1,540 feet. (L. S.)	1413
Rowlee & McCloy. C.	2,549	13-6 $\frac{1}{8}$	.....	.....	.....	.....	.....	1905	(L. S.)	1414
.....do.....	D.	2,710	13-6 $\frac{1}{8}$	.....	.....	.....	.....	1905	No oil; some water at 365-371 and 1,115-1,120 feet. (L. S.)	1415
Lyle & McCloy....	C.	2,201	10-6	.....	.....	.....	b 40	1904	Fifty feet sand at 2,155 feet; salt water at 2,160 feet; first oil at 2,167 feet; second oil at 2,187 feet. (L. S.)	1416
McCloy & Rowlee .	C.	2,343	13-6 $\frac{1}{8}$	.....	.....	.....	.....	1905	(L. S.)	1416a
Jerry Flynn and B. Carroll.	O.	2,620	18-0 $\frac{1}{8}$	.....	.....	.....	.....	1904	Show of oil at 2,228-2,250 feet; oil sand at 2,597-2,613 feet; a small well. (L. S.)	1417
.....	C.	1,160	.....	.....	.....	.....	.....	1905	(L.)	1418

RHODE ISLAND.

.....	O.	1,285	8-6	538	-32	40	1905	Hard water; lowered 100 feet by pumping; temperature, 52°. (S.)	1419
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SOUTH CAROLINA.

Perry Andrews.....	560	1905	(L.)	1420
J. M. Jennings.....	M.	520	3	+30	75	1421
.....do.....	M.	525	2	525	+30	40	1902	Soft iron and sulphur water.	1422
.....do.....	O.	510	3	510	+30	60	.....	1904	Water at 360 feet; supply soft.	1423
.....do.....	O.	565	2	.....	+40	60	.....	.....	.....	1424

b Barrels a day.

Summary of well drilling

SOUTH CAROLINA—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1425	Water..	Barnwell.....	Otranto, 2 m. N. of....	Edwin Parsons.....	Hughes Specialty Well Drilling Co.
a1426	...do...	Charleston.....	Fort Moultrie.....	United States.....	W. H. Gray & Co.
1427	...do...	Clarendon.....	Silver.....	J. M. Richardson...	Hughes Specialty Well Drilling Co.
1428	...do...	Dorchester.....	Summerville.....	Summerville Ice and Cold Storage Co.	.....
1429	...do...	Georgetown.....	Georgetown, SW. of....	Atlantic Coast Lumber Corporation.	Hughes Specialty Well Drilling Co.
1430	...do...	...do...	...do...	...do...	...do...
1431	...do...	...do...	...do...	...do...	...do...
1432	...do...	...do...	Georgetown, 1 m. W. of.	...do...	...do...
1433	...do...	...do...	Georgetown, SW. of....	...do...	...do...
1434	...do...	...do...	...do...	...do...	...do...
1435	...do...	...do...	...do...	...do...	...do...
1436	...do...	...do...	...do...	...do...	...do...
1437	...do...	...do...	Georgetown.....	Town of Georgetown.	...do...
1438	...do...	...do...	Waverly Mills, 1½ m. S. of, township 7.	R. Nesbit.....	.....
1439	...do...	...do...	Waverly Mills.....	Waverly Supply Co.	.....
a1440	...do...	Hampton.....	Hampton, 6 m. W. of ..	P. W. Lightsey.....	J. M. Jennings.....
1441	...do...	...do...	Luray, near post-office.	Town of Luray.....	.....
1442	...do...	Horry.....	Conway, ¾ m. NW. of post-office.	F. A. Burrough.....	.....
1443	...do...	...do...	Conway, ½ m. W. of	R. G. Dusenbury...	.....
1444	...do...	...do...	Conway, 3 blocks SE. of post-office.	C. P. Quattlebaum.	.....
1445	...do...	...do...	Conway, ¾ m. NE. of post-office.	D. A. Spray.....	.....
1446	...do...	...do...	Nixonville, 3 m. NE. of.	Gardner Lumber Co	.....
1447	...do...	...do...	Rex.....	J. L. Butler.....	.....
a1448	...do...	Lee.....	Bishopville, near post-office.	Town of Bishopville.	Hughes Specialty Well Drilling Co.
a1449	...do...	Orangeburg.....	Orangeburg, ½ m. E. of.	Crystal Ice Co.....	...do...
1450	...do...	Sumter.....	Sumter, 1½ m. N. of	Sumter Waterworks	Ridpath & Potter
1451	...do...	Williamsburg.....	Salters Depot, 2½ m. SE. of.	J. C. Everett.....	.....
1452	...do...	York.....	Rock Hill, ¼ m. W. of ..	Rock Hill Water, Light and Power Co.	.....
1453	...do...	Williamsburg.....	Salters Depot, 3 m. SE. of.	E. T. Hamer.....	.....
1454	...do...	...do...	Salters Depot.....	J. H. Flavel.....	.....

a See detailed record at end of table.

reported in 1905—Continued.

SOUTH CAROLINA—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Henry Shoates....	C.	918	4½-2	870	+ 9	1	.....	1905	(L. S.).....	1425
.....	M.	1,920	9-6	1,820	+72	150	.....	1905	Water soft. (L.)....	1426
.....	C.	850	6-3	540	.....	.....	20	1905	From 380-400, 540-560, 720-730 feet. (L.)	1427
Simons & Mayrant	D.	531	8-3	531	-23	.....	80	1904	.....	1428
Hughes Specialty Well Drilling Co.	C.	569½	4½-3	520	Flows.	.....	50	1900	.....	1429
.....do.....	C.	580	4½-3	520	.....	.....	50	1900	.....	1430
.....do.....	C.	571	4½-3	520	.....	.....	50	1900	.....	1431
.....do.....	C.	615	8-6	570	+ 4	10	50	1900	Water also at 520-530 feet; main supply soft. (L.)	1432
.....do.....	C.	587	4½-3	570	+ 7	.....	50	1900	Water at 50-100 (not good), 500-520, 520-570 feet; main supply soft.	1433
.....do.....	C.	573	4½-3	520	.....	.....	.....	1900	.....	1434
.....do.....	C.	564	4½-3	520	+10	10	50	1900	Water also at 500-520 feet.	1435
.....do.....	C.	566	4½-3	520	.....	.....	.....	1900	.....	1436
.....do.....	C.	690	12-6	660	+30	160	500	.....	.....	1437
A. N. Cox.....	O.	446	2-1	446	-40	6	13	1897	Alkaline water.....	1438
.....do.....	O.	446	2	.....	.....	.....	13	1905	.....	1439
J. M. Jennings & Sons.	C.	735	2	735	+75	75	.....	1905	Water at 40 and 145 feet. (S. L.)	1440
J. M. Jennings.....	M.	865	2	.....	+65	75	.....	1905	.....	1441
A. N. Cox.....	O.	247	2-1½	247	+15	4	36	1903	Soft alkaline water...	1442
.....do.....	O.	363	2	363	+22	12	.....	1905	Alkaline sulphur.....	1443
.....do.....	O.	222	2-1½	222	+28	5	.....	1896	Soft; temperature, 70°	1444
.....do.....	O.	340	2	340	+20	3	7	1898	Alkaline water.....	1445
.....do.....	O.	210	2	210	-85	.....	9	1904	Alkaline.....	1446
J. P. Butler.....	D.	170	2	.....	Flows.	7	.....	.....	.....	1447
Henry Shoates....	C.	292	8-6	262	-19	.....	76	1905	Town supply (L. S.)	1448
.....do.....	C.	228	4½	190	-12	.....	.....	1905	Three wells; total yield, 400 gallons per minute; hard water. (L. S.)	1449
.....	C.	429	6-4½	403	.....	.....	220	1905	(L.)	1450
J. M. Godwin.....	O.	333	2-1	333	+10	1½	.....	1904	Soft water; temperature, 68°.	1451
Perry Andrews.....	.....	300	10-7	.....	-35	.....	80	1900	Soft water.....	1452
E. T. Hamer.....	O.	375	2	365	Flows.	2	.....	1903	Soft water; temperature, 68°.	1453
J. Mather.....	M.	390	2	390	Flows.	3	.....	1904	Soft water; temperature, 60°.	1454

*Summary of well drilling***SOUTH DAKOTA.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1455	Water.	Beadle.....	Carthage, 11 m. NW. of, sec. 26, T. 109, R. 59.	N. E. Harmon.....	H. B. Potter.....
1456	...do...	Grant.....	Milbank.....	Wm. Gaynor.....	.....
1457	...do...	Lyman.....	.....	Abbink.....	.....
1458	...do...	Miner.....	Carthage, 6 m. SE. of, sec. 5, T. 107, R. 57.	F. B. Ward.....	H. B. Potter.....
a1458a	...do...	...do.....	Roswell, 2½ m. N. of, sec. 31, T. 107, R. 57.	Henry Bremer.....	...do.....
1459	...do...	...do.....	Vilas.....	City of Vilas.....	.....
1460	...do...	Sully.....	Okobojo, 7 m. NW. of, sec. 24, T. 115, R. 80.	Joseph Pickelot.....	Rolewitch & Hanson.
1461	...do...	Yankton.....	Yankton, 1 m. NE. of..	Chicago, Milwaukee and St. Paul R.R.	J. H. Shaw.....

TENNESSEE.

1462	Water..	Bedford.....	Rover, 1 m. S. of.....	W. F. Elmore.....	Wheeler & Pressgrove.
1463	...do...	...do.....	Rover.....	C. E. Hammond.....	.....
1464	...do...	...do.....	Unionville, 1 m. N. of..	H. R. Freeman.....	E. L. Kirk.....
1465	...do...	Benton.....	Big Sandy, in public square.	Town of Big Sandy.	E. F. Doudna.....
1466	...do...	Carroll.....	McKenzie, ¼ m. E. of post-office.	McKenzie Water Co.	.....
1467	...do...	Coffee.....	Tullahoma, ¼ m. SE. of.	City of Tullahoma..	Sydnor Well and Pump Co.
1468	Test hole	Cumberland...	Isoline, 2 m. E. of.....	Wm. Dunne.....	.....
1469	Water..	Davidson.....	Nashville, Cumyo Hill..	A. L. Moore.....	.....
1470	...do...	...do.....	Nashville, Flat Rock...	W. H. Timmons.....	.....
1471	Oil.....	Dekalb.....	Smithville, 4 m. W. of..	Caney Fork Oil and Mining Co.	Caney Fork Oil and Mining Co.
1472	Water..	Decatur.....	Bob.....	James Barber.....	Chas. Tinin.....
1473	...do...	...do.....	Vise, 1 m. SW. of.....	James Sims.....	...do.....
1474	Oil.....	Dickson.....	White Bluff, 5 m. N. of..	H. A. Zegrosser.....	Leonard Call.....
1475	Water..	Gibson.....	Humboldt, ½ m. N. of..	S. T. Beare.....	.....
1476	...do...	Hamblen.....	Morristown, ¼ m. SE. of.	Morristown Produce and Ice Co.	J. G. Templin....
1477	...do...	...do.....	Whitesburg, 4 m. NE. of	Calvin-Gulley.....	...do.....
1478	...do...	Jefferson.....	Jefferson, ¼ m. S. of...	C. and N. College...	...do.....
1479	Oil.....	McNairy.....	Selmer.....	Acacia Development Co.	.....
1480	Water..	Montgomery..	Port Royal, 4 m. N. of post-office.	John Alen.....	.....
1481	...do...	...do.....	Port Royal, 2½ m. W. of.	George Farmer.....	J. B. Poole.....
1482	...do...	...do.....	Port Royal, 2 m. W. of.	Sam Wilkerson.....	John G. Jones....
1483	...do...	Perry.....	Linden.....	Town of Linden.....	.....
1484	...do...	...do.....	Webbs Landing, 1½ m. E. of.	T. C. Byrd.....	Chas. Tinin.....

a See detailed record at end of table.

reported in 1905—Continued.

SOUTH DAKOTA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
H. B. Potter.....	C.	<i>Ft.</i> 818	<i>In.</i> 2	<i>Ft.</i> 767	<i>Ft.</i> + 88	<i>Gals.</i> 85	.....	1904	(L.).....	1455
L. E. Morley.....	D.	350	.....	.....	.....	.....	.....	1905	(S.).....	1456
D. Abbink.....	D.	1,356	.....	.....	Flows.	60	.....	1904	Temperature, 120° F.	1457
H. B. Potter.....	C.	856	2	800	.....	80	.....	1904	Water at 710 feet; water soft.	1458
.....do.....	C.	710	2	672	Flows.	95	.....	1905	Soft water.....	1458a
Hellar.....	M.	473	.....	.....	.....	.....	.....	1905	(S.).....	1459
Rolewitch & Hanson.	C.	1,700	2-2	1,500	.....	100	.....	1905	(L. S.).....	1460
J. D. Shaw.....	D.	525	8	458	+ 82	.....	.....	1905	Heavy flow for 1 day; water at 28-74, 330-337, 458-525 feet. (L. S.)	1461

TENNESSEE.

.....	O.	165	6-5	165	- 33	.....	.....	1901	Soft sulphur water; iron bearing.	1462
.....	O.	101	6	100	- 9	.....	.....	.....	Hard water.....	1463
E. L. Kirk.....	O.	130	6-5	130	- 30	.....	.....	1887	Hard water. (L.).....	1464
O. D. Thomas and Ed Duncan.	C.	807	12-6	.....	- 4	.....	.....	1905	Unfinished; salty water. (L.)	1465
.....	M.	190	8-6	75	- 75	.....	40	1903	Hard, iron water.....	1466
.....	M.	195	8	120	- 45	.....	210	1902	2 wells; town supply; fine water.	1467
E. O. Hembree.....	C.	140	.....	60	0	5	.....	1903	Soft water; not used.	1468
W. D. Galloway.....	D.	116	.....	.....	.....	.....	.....	1905	(S.).....	1469
.....do.....	D.	210	6	.....	.....	.....	.....	1905	(S.).....	1470
M. Brasswell.....	M.	800	8-6	.....	.....	.....	.....	1904	Show of oil; salt sulphur water at 50 feet. (S.)	1471
Chas. Tinin.....	C.	142	6-5½	132	-100	.....	.....	1903	Hard water.....	1472
.....do.....	C.	135	6	135	- 75	.....	.....	1902	Sulphur water.....	1473
W. H. Anderson.....	.....	750	8-5½	.....	.....	.....	.....	1901	Water at 135 feet; dry.	1474
.....	O.	175	6	.....	- 18	.....	60	1902	(L.).....	1475
J. G. Templin.....	D.	150	6	140	- 13	.....	35	1902	Hard water.....	1476
.....do.....	C.	150	6	142	.....	.....	20	1902	.....	1477
.....do.....	C.	127	5	85	.....	.....	.....	1902	(L.).....	1478
W. H. Anderson.....	D.	510	10-6½	315	- 45	.....	200	1905	No oil; soft water, good at 40 feet, foul smelling at 315 feet. (L.)	1479
J. B. Poole.....	D.	145	6	143	- 43	.....	.....	1904	Sulphur water.....	1480
J. Y. Poole.....	D.	100	6	.....	.....	.....	.....	1905	(L.).....	1481
John G. Jones.....	C.	350	8-5½	345	- 60	.....	.....	1898	Hard water.....	1482
Chas. Tinin.....	D.	130	6-5	125	- 80	.....	.....	1901	Hard water; town well.	1483
.....do.....	C.	105	6	105	- 65	.....	.....	1902	Hard water near surface, sulphur water at bottom.	1484

Summary of well drilling

TENNESSEE—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1485	Water..	Robertson.....	Adams.....	Town of Adams....	J. B. Poole.....
1486	...do...	...do.....	Adams, 7 m. W. of....	Robert Bowen.....	...do.....
1487	...do...	...do.....	Adams, 7½ m. E. of....	Ockey.....	...do.....
1488	...do...	...do.....	Glenraven, ½ m. N. of...	F. G. Ewing.....	.....
1489	...do...	...do.....	Ridge Top, 1 m. S. of....	John Woods.....	John G. Jones....
1490	...do...	...do.....	Springfield, 5 m. N. of....	J. W. Lang.....	White & Benton..
1491	...do...	...do.....	Springfield, ¼ m. of....	J. W. Stark.....	S. T. Jackson....
1492	...do...	Washington.....	Limestone, 3 m. SE. of....	Washington College	J. G. Templin....
1493	Oil.....	Webster.....	Sebree, near post-office.	Sebree Oil and Gas Co.	.....

TEXAS.

1494	Water..	Andrews.....	Hollebeke, 10 m. W. of..	John Burton.....	.....
1495	...do...	Arlington.....	Arlington, near post-office.	.....	.....
1496	...do...	...do.....	Arlington, ½ m. E. of....	.....	.....
1497	...do...	...do.....	Arlington, ¼ m. N. of....	W. M. Dugan.....	.....
1498	...do...	Armstrong.....	Claude, ½ m. SW. of....	J. E. Hill.....	.....
1499	...do...	...do.....	Claude, 2 m. NW. of....	Tom Perkins.....	.....
1500	...do...	Atascosa.....	Campbelton, 3¼ m. W. of.	E. M. Tom.....	.....
1501	...do...	...do.....	Pleasanton.....	L. A. Franks.....	.....
1502	...do...	...do.....	Pleasanton, 3½ m. NE. of.	W. B. Fuller.....	.....
1503	...do...	...do.....	Pleasanton, 11 m. from.	Mrs. T. W. Oden....	.....
1504	...do...	Bastrop.....	Red Rock.....	A. D. Harris.....	J. E. Donnelly....
1505	...do...	...do.....	Red Rock, 1 m. W. of....	Jeff Myers.....	.....
1506	...do...	Bee.....	Beeville, ½ m. N. of....	Chas. Dower.....	.....
1507	...do...	...do.....	Beeville.....	D. C. Rankin.....	.....
1508	...do...	Bell.....	Temple, ¼ m. SE. of....	Werkheiser - Polk Milling Co.	Werkheiser-Polk Milling Co.
1509	...do...	...do.....	Youngsfort.....	J. N. Ballard & Co..	Robt. Hash.....
1510	...do...	...do.....	...do.....	J. O. Stark.....	.....
1511	...do...	Bexar.....	Boerne, 6 m. W. of....	G. Schmeltzer.....	.....
1512	...do...	...do.....	Bracken, 3 m. W. of....	P. J. Classen.....	.....
1513	...do...	...do.....	Leon Springs, 1 m. from.	Geo. C. Altgelt.....	.....
1514	...do...	...do.....	Leon Springs, 4 m. S. of.	Joe Beckman.....	.....
1515	...do...	...do.....	Leon Springs, 2 m. N. of.	Col. Dave Brody...	H. T. Schwab....

reported in 1905—Continued.

TENNESSEE—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. B. Poole.....	C.	100	6	85	— 50	.....	.....	1900	Hard water.....	1485
.....do.....	C.	100	6	95	.....	.....	.....	1905	(L.).....	1486
.....do.....	M.	100	6	100	2	.....	.....	1905	(L. S.).....	1487
John G. Jones.....	D.	152	6-4½	140	— 80	.....	20	1902	Water at 70 and 110 feet; water soft.	1488
.....do.....	C.	197	8-5½	180	— 48	.....	1	1902	"Very soft water"...	1489
.....do.....	D.	134	6	114	— 54	.....	250	1903	Bad water.....	1490
S. T. Jackson.....	C.	107	6	77	— 77	.....	.....	.....	Sulphur water.....	1491
J. G. Templin.....	C.	155	4½	155	— 85	.....	10	1903	Water at 80 feet. (L.)	1492
R. C. McGarry and E. F. Doudna.	D.	595	10-6½	45	Flows.	.....	.....	1904	Small show of oil at 532 feet; gas at 560 feet; salt water at 555 feet; flow is salty. (L.)	1493

TEXAS.

W. H. Howell.....	D.	152	6	140	.....	.....	10	1903	.....	1494
S. S. Goodwin.....	D.	1,480	.....	.....	+ 50	70	.....	.....	.....	1495
.....do.....	D.	800	.....	800	.....	.....	.....	.....	Hard water at 60-80 and 100-150 feet; soft water at 210-230 and 775-800 feet. (L.)	1496
.....do.....	D.	224	4-3	216	— 90	.....	3½	1901	Soft water at 130 and 190 feet; hard water.	1497
Chas. D. Slay.....	D.	238	6-4	200	—195	.....	° 5	1901	Soft water.....	1498
.....do.....	D.	220	6-4	208	—200	.....	6	1901	.....do.....	1499
Jack Parckman.....	M.	890	2	890	Flows.	50	.....	1905	Brackish water; 7 other water-bearing beds.	1500
J. Allemas.....	M.	420	3	400	+ 17	25	.....	1903	Soft sulphur water. (L.)	1501
S. H. Cook.....	M.	314	3	280	Flows.	65	.....	1904	Soft water.....	1502
J. W. Cook.....	D.	447	2	400	+ 15	30	.....	1903	Water at 250, 320, 400-447 feet; soft water.	1503
J. E. Donnelly.....	C.	143	5	115	.....	.....	3	1904	Slightly iron-bearing water. (L.)	1504
F. P. Donnelly.....	D.	150	6	125	— 50	.....	.....	.....	Soft water.....	1505
Homer Powell.....	D.	240	5½	240	— 40	.....	300	1903	.....do.....	1506
T. Powell.....	O.	187	5½	.....	— 35	.....	37	1902	Water at 80 and 100 feet.	1507
D. McKee.....	O.	225	6	220	± 0	30	.....	1905	Salty. (L.).....	1508
R. Hash.....	O.	475	6½	435	+ 5	2½	.....	1904	Water at 115-325 feet; soft, slightly sulphur-bearing.	1509
J. O. Stark.....	O.	417	6-2	408	+ 26	3	.....	1896	Soft water.....	1510
Emil Menn.....	D.	365	6	340	—165	.....	.....	1905	Hard water.....	1511
Otto Oppermann.....	D.	925	7	300	—284	.....	12	1905	.....do.....	1512
H. T. Schwab.....	M.	330	6	250	—235	.....	.....	1903	.....do.....	1513
Emil Menn.....	M.	296	6	296	—146	.....	.....	1903	Water at 16, 80, and 120 feet; hard sulphur water.	1514
H. T. Schwab.....	C.	833	6	310	—300	.....	5	1904	Sweet water. (L.)...	1515

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1516	Water..	Bexar.....	Leon Springs, 4 m. SW. of.	August Liebe.....	.....
1517	....do....	....do....	Leon Springs, 1½ m. N. of.	John L. Moreau.....	.....
1518	....do....	....do....	Schertz, 1½ m. W. of....	Southern Pacific R. R.	.....
1519	....do....	....do....	San Antonio, near post-office.	T. H. Casey.....	.....
1520	....do....	....do....	San Antonio, 5 m. W. of.	Dr. A. Herff.....	.....
a1521	....do....	....do....	San Antonio, 4 m. SW. of.	R. H. Hofheinz.....	.....
1522	....do....	....do....	San Antonio, 5 m. SW. of.	Allen Kelly.....	.....
1523	Oil.....	....do....	San Antonio, 8 m. W. of.	C. L. Mackey.....	R. A. McKnight..
1524	Water..	....do....	San Antonio, 5 m. SW. of.	Duncan Mackey.....	.....
1525	....do....	....do....	San Antonio, 2½ m. NW. of.	D. A. Meyer.....	Jno. T. Dixon....
a1526	....do....	....do....	San Antonio, South Flores street.	Richard Tommins..	.....
1527	Oil.....	....do....	San Antonio, 9 m. SW. of.	Wesiger.....	.....
1528	Water..	....do....	Wetmore, 4 m. W. of..	Ferd. Grote.....	.....
1529	....do....	Bosque.....	Clifton, 5 m. NE. of....	Jacob Nelson.....	.....
1530	....do....	....do....	Cranfills Gap, 5 m. E. of.	Thos. Rackstad.....	.....
1531	....do....	Brazoria.....	Alvin, 12 m. S. of, NE. ¼, SE. ¼, sec. 1, Austin League.	W. Weyant.....	.....
1532	Oil.....	....do....	Damon Mound, Mulcahy well No. 2.	R. T. Mulcahy.....	.....
1533	Water..	Brown.....	Bangs, 4 m. W. of.....	E. W. Eiland.....	.....
1534	....do....	....do....	Bangs, 5 m. SW. of....	M. L. Huggins.....	.....
1535	Oil.....	....do....	Brownwood, 1 m. SW. of.	C. M. Gearing.....	C. M. Gearing....
1536	....do....	....do....	Brownwood, ½ m. SW. of.	....do....	.....
1537	Water..	Caldwell.....	Dale.....	Jim Alexander.....	.....
1538	....do....	....do....	Dale, ¼ m. E. of.....	Andy Myers.....	.....
1539	....do....	....do....	Lockhart, 6 m. E. of....	G. F. Donnelley.....	.....
1540	....do....	....do....	Lockhart.....	Hepenstall.....	.....
1541	....do....	....do....	....do....	Jacobs.....	.....

a See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Wm. Schwartz....	O.	300	7	285	-215	.....	.....	1898	Soft water.....	1516
Henry T. Schwab..	O.	302	6	300	- 60	.....	3	1903	.....do.....	1517
J. P. Benkendorfer	D.	563	8	520	- 81	.....	700	1904	Hard water. (L.)....	1518
.....do.....	D.	781	6	705	+ 30	Large	.....	1905	Soft water; sulphur water at 455 feet. (L.)	1519
.....do.....	D.	1,266	8	1,090	+ 2	.....	1,200	1903	Hard water. (L.)....	1520
.....do.....	D.	1,453	6	1,054	+ 6	300	.....	1905	Soft, contains iron; struck hard water at 600-800 feet and sulphur water at 800-910 feet. (L.)	1521
R. A. McKnight...	D.	1,525	8	1,400	+ 7	365	.....	1905	Hard water at 650, 1,186 and 1,400 feet; salt, sulphur at 800 feet; bitter iron water at 1,475 feet.	
.....do.....	D.	1,000	6	400	.....	.....	.....	1902	Yield, 2 barrels in 24 hours. (L.)	1523
Judson & Davison.	D.	1,186	10-8	1,175	+ 9	450	.....	1905	Water at 766 and 1,078 feet. (L.)	1524
Jno. T. Dixon.....	D.	610	6½	555	+ 4	.....	.....	.....	Hard water. (L.)....	1525
Milo M. Garvin....	D.	1,413	10-5½	1,410	Flows.	.....	.....	1902	Fresh water; flows a 4-inch stream; flow of sulphur water at 1,137 feet. (L.)	1526
R. A. McKnight...	D.	600	6	.....	.....	.....	2	1904	Oil at 244-256 feet; rose to 125 feet. (L.)	1527
Ferd. Grote.....	O.	382	7½-4½	380	-200	.....	60	1899	Little water at 270 feet; supply is soft.	1528
Wm. Countson....	D.	394	6	.....	.....	.....	2	1904	Soft water.....	1529
.....do.....	D.	317	6	300	-290	.....	.....	.....	.....do.....	1530
A. S. Smith.....	O.	1,509	5	1,360	+ 40	62½	.....	1905	Drilled for oil; water sand at 1,360-1,509 feet; water contains iron and magnesia, and is sulphuretted. (L.)	1531
J. F. Rowand.....	O.	215	.....	.....	.....	.....	.....	1905	Salt, sulphur water; abandoned. (S.)	1532
W. W. Grimes.....	M.	211	6	200	- 80	.....	100	1905	Salty water.....	1533
.....do.....	M.	194	6	190	- 30	.....	.....	1905	Hard water.....	1534
.....do.....	O.	2,021	10-4½	925	± 0	Small	.....	1902	Little salt water at 110, more at 925 feet. (L.)	1535
C. M. Gearing.....	D.	1,635	8-5½	1,150	.....	.....	.....	1904	No fresh water; salt water at 950 and 1,155 feet; show of oil at 1,150 feet. (L.)	1536
F. P. Donnelly....	D.	150	6	100	- 75	.....	.....	.....	Soft water. (L.)....	1537
.....do.....	D.	150	.....	100	-100	.....	.....	.....	Soft water.....	1538
.....do.....	D.	300	6	300	- 25	.....	.....	.....	.....do.....	1539
.....do.....	D.	325	6	.....	.....	.....	.....	1904	Dry hole. (L.).....	1540
.....do.....	D.	700	6	.....	- 30	.....	.....	.....	.....do.....	1541

b Barrels a day.

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1542	Oil.....	Caldwell.....	Lockhart, 4 m. N. of...	Lockhart Oil Co.....	
1543	Water.....	do.....	Lockhart.....	Schunmann.....	J. E. Donnelly & Monk.
1544	do.....	do.....	do.....	Joe Smith.....	
1545	do.....	do.....	Lockhart, $\frac{1}{2}$ m. S. of...	Ike Tresinbeck.....	
1546	do.....	Cameron.....	Katharine, 7 m. NW. of.	J. B. Armstrong.....	
^a 1547	do.....	do.....	Sauz, 7 m. SE. of.....	Mrs. H. M. King.....	
1548	do.....	Childress.....	Childress, $\frac{1}{2}$ m. SW. of.	Fort Worth and Denver R. R.	J. K. Reynolds & Co.
1549	Oil.....	Clay.....	Henrietta, 12 m. N. of, Lockridge farm.	Lockridge Oil Co...	J. J. Myers.....
^a 1550	do.....	do.....	do.....	do.....	do.....
1551	do.....	do.....	Petrolia, 2 m. E. of...	Chilton.....	
1552	do.....	do.....	Petrolia, 1 m. S. of...	J. W. Fields.....	
^a 1553	do.....	Coleman.....	Trickham, $1\frac{1}{2}$ m. SW. of, on W. F. Guthrie ranch.	Santa Anna Industrial Co.	Milo M. Garvin...
1554	do.....	do.....	Santa Anna, 16 m. SE. of.	L. L. Sheelett.....	
1555	Oil.....	do.....	Trickham, $\frac{1}{2}$ m. NE. of.	L. L. Shields.....	
1556	Water.....	do.....	Trickham.....	do.....	
1557	do.....	Comal.....	Bracken, near post-office.	Cy: Simon.....	
1558	do.....	do.....	Bulverde, 1 m. NE. of.	Louis Bartels.....	
1559	do.....	do.....	Smithsons Valley, 3 m. SE. of.	Louis Hoag.....	
1560	do.....	Comanche.....	Comanche, $1\frac{1}{2}$ m. W. of.	Mr. Ainsworth.....	
1561	do.....	do.....	Wilson, 2 m. NE. of...	G. W. Cride.....	
1562	do.....	Concho.....	do.....	Joe Curry.....	
1563	Water..	Coryell.....	Leon Junction, 4 m. S. of.	C. R. Phillips.....	
1564	do.....	do.....	Gatesville.....	County Commissioners.	A. F. Damon.....
1565	do.....	Dallam.....	Conlen, $5\frac{1}{2}$ m. NW. of...	Thos. Quinn.....	Thos. Quinn.....
^a 1566	do.....	Dallas.....	Dallas, 2 m. NW. of...	City of Dallas.....	W. B. Sharp.....
1567	do.....	Denton.....	Denton, 3 m. SW. of...	do.....	J. J. Myers.....

^a See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	M.	1,650	8-6 $\frac{1}{2}$	160			5	1903	Salt water, with a little oil at 160 feet. (L.)	1542
J. E. Donnelly & Monk.	C.	277	6	239				1905	Seep of salt water with oil and gas at 239 feet. (L.)	1543
F. P. Donnelly	D.	105	6	100	- 75			1904	Soft water. (L.)	1544
do.	D.	150	6	150	-100				do.	1545
Thos. Fowler	D.	830	5	808			105	1902	Casing ends at 305 feet. (L.)	1546
A. W. Ferguson	D.	1,613				135		1904	Alkaline iron water; salty water at 18-26, 36-50, 120-140, and 370-400 feet. (L.)	1547
Reynolds	O.	2,075	14-6 $\frac{1}{2}$					1905	Hard salty water at 240-755 feet; casing collapsed; well abandoned. (L.)	1548
R. C. Lindley	C.	280	5 $\frac{1}{2}$				b 25	1904	(L.)	1549
do.	C.	476	5 $\frac{1}{2}$				b 5	1904	Water 375-385 feet. (L.)	1550
E. B. Cass	D.	320			- 50			1904		1551
W. C. Sutherland	M.	217						1905	(S.)	1552
Milo M. Garvin	C.	940	8 $\frac{1}{2}$ -6 $\frac{1}{2}$					1905	Plugged with casing; salt water at 297-328 feet; flows 200 gallons per minute; show of gas 215 feet. (L.)	1553
	M.	185						1891	Well yields oil.	1554
	M.	480	8	76	+ 0			1904	Water hard and salty; not used; drilling stopped by loss of tools.	1555
	M.	185	6	40	Flows.			1891	Very salt water; not used.	1556
H. T. Schwab	D.	246	7-5 $\frac{1}{2}$	240	- 141		16	1905	Water at 170 feet; soft at 240 feet.	1557
Richard Schwarz	D.	465	6 $\frac{1}{2}$ -6	400	-250		25	1902	Soft water; not lowered by pumping.	1558
Wm. Schwarz	D.	818	7-6 $\frac{1}{2}$	765	-475			1901	Soft water.	1559
W. W. Standifer	D.	150	6	140	- 30			1903	Hard water.	1560
W. F. Alexander	D.	226	7 $\frac{1}{2}$ -6 $\frac{1}{2}$	190	-190			1902	do.	1561
J. F. Ford	M.	505							No water; second deepest well in Concho County.	1562
W. L. Cass	D.	745	7-5	350				1905	Soft water; also at 700 feet.	1563
A. F. Damon	D.	800	8 $\frac{1}{2}$ -5 $\frac{1}{2}$	795	+ 6	40		1898	Water soft.	1564
Thos. Quinn	O.	340	4 $\frac{1}{2}$	320				1901	Plentiful supply of soft water.	1565
John Sharp	M.	2,585	10-3 $\frac{1}{2}$	2,420	+235	660		1904	Hard water; also water at 780, 1,500, 2,200, and 2,400 feet.	1566
J. J. Myers	C.	435	6 $\frac{1}{2}$ -4 $\frac{1}{2}$	420		20		1897	Water 360-380 and 420-435 feet. (L.)	1567

b Barrels a day.

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1568	Water	Denton	Denton, 6 m. S. of	John Stewart	E. I. Keyte
a1569	do.	Dimmit	Carrizo Springs, 3 m. N. of.	F. Moehrig	
1570	do.	Duval	Benavides, 4 m. S. of	A. Parr	
1571	do.	do.	Benavides, 5 m. SE. of	S. R. Peters	
1572	do.	do.	Benavides, 4 m. E. of	do.	
1573	do.	do.	Benavides, 25 m. S. of	Mrs. H. L. Shoemaker.	
a1574	Oil	do.	Benavides, 3 m. NE. of, No. 6 well, on W. A. Tinny farm, Piedras Pintas district.	Jerry F. Smith	Lawson & Knight
1575	Water	do.	Realitos, 5 m. N. of	R. Driscoll	
1576	do.	do.	Realitos, 1 m. NE. of	J. Vining	
1577	do.	do.	San Diego	Croft & Co.	J. J. White
1578	Oil	Eastland	Cisco, 1 m. SW. of	A. J. Alson	J. F. Turknett
1578a	Water	do.	Cisco	J. E. McConliss	
1579	do.	Edwards	Rock Springs, 26 m. SE. of.	Chas. Blandon	
1580	do.	do.	Rock Springs, 10 m. E. of.	S. Buimbella	
1581	do.	do.	Rock Springs, 30 m. SW. of.	A. B. Prior	
1582	do.	do.	Rock Springs, 13 m. SW. of.	Thos. Smith	
1583	do.	do.	Rocksprings	Gus Wheat	Smart & Hamilton.
1584	do.	do.	do.	do.	do.
1585	do.	do.	do.	do.	do.
1586	do.	do.	Rocksprings, 28 m. NW. of, section 88.	Ira L. Wheat	
1587	do.	do.	Rocksprings, 22 m. NW. of.	do.	
1588	do.	do.	Sonora, 25 m. S. of		
1589	do.	do.	Sonora, 22 m. from	Ed. Decie	
1590	do.	do.	Sonora, 30 m. S. of	F. M. Wyatt	
1591	do.	Ellis	Waxahachie, 4 m. W. of.	C. W. Gibson	L. B. Wallen
1592	do.	do.	Waxahachie	City of Waxahachie	
1593	do.	El Paso	El Paso, 2½ m. NE. of	Highland Water Co.	
1594	do.	do.	Orange, N. Mex., 8 m. SW. of, sec. 5, T. 1, R. 69.	Rush & Sons	
1595	do.	Erath	Clairette, 3½ m. NE. of	W. Hallas & Co.	M. D. Ledwell
1596	do.	do.	Clairette, 4 m. NE. of	R. E. Lee	do.

a See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
T. Stringer.....		Ft. 602	In. 4	Ft.	Ft.	Gals. 4	Gals.	1905	Soft water.....	1568
F. Moehrig.....	O.	550	5½	380	.....	150	.....	1903	Salt water at 35 feet; fresh at 470 feet; supply soft, used for irrigation; another well, 510 feet deep. (L.)	1569
J. J. White.....		185	6	180	— 50	.....	75	1903	Soft water; also at 50 and 165 feet.	1570
W. M. David.....	D.	174	6-5	165	—108	.....	7	1904	Soft water; water at 45 feet.	1571
.....do.....	D.	190	6	190	— 60	.....	7	1904	Soft water; water at 40 feet.	1572
J. J. White.....	D.	470	6	145	.....	.....	.....	.....	Soft water; slight flow. (L.)	1573
Lawson & Knight.....		500	6	.....	.....	.....	12	1905	Water with oil and gas at 230 feet; gas at 460 feet; oil and gas at 500 feet. (L.)	1574
J. J. White.....	D.	400	6	.....	.....	.....	.....	1904	Seeps of sulphur water at 141, 180, and 230 feet. (L.)	1575
A. J. Ashworth.....	D.	120	6	118	— 20	.....	.....	1904	Soft water.	1576
J. J. White.....	C.	231	6	200	— 40	.....	15	1902	Soft water. (L.)	1577
J. F. Turknett.....	C.	242	.....	.....	.....	.....	.....	1905	(L.)	1578
H. A. McConliss.....	M.	179	5½	149	—140	.....	.....	1905	Soft water.....	1578a
Tom Jones.....	M.	350	6½	350	— 318	.....	18	1900	Soft water.....	1579
J. S. Yates.....	D.	355	6	335	—335	.....	25	1897	Hard water.....	1580
J. H. Lohmann.....	D.	392	6½	303	—300	.....	2½	1902	Soft water.....	1581
.....	O.	200	6	200	—100	.....	.....	.....	.....do.....	1582
S. Hamilton.....	M.	405	6	.....	— 32	.....	.....	1890	Good supply; soft...	1583
.....do.....	M.	312	6	.....	.....	.....	.....	1905	No water.....	1584
.....do.....	M.	280	6	.....	.....	.....	6	.....	.....	1585
M. S. Lackey.....	O.	362	6½	350	.....	.....	.....	1905	Water at 312 feet; main supply soft.	1586
.....	O.	405	.....	405	.....	.....	50	1891	Soft water; water at 280 feet.	1587
John Smith.....	O.	440	6	390	—330	.....	10	1890	Hard.....	1588
Ed. Smith.....		440	6	290	—280	.....	10	1890	.....	1589
F. M. Wyatt.....	O.	254	6	243	.....	.....	50	1901	Hard water; one of two wells. (L.)	1590
Edward Wallam.....	C.	672	4-2	660	.....	.....	.....	1904	Soft water.....	1591
.....		2,430	.....	.....	.....	.....	.....	.....	Drilling in progress on Jan. 1, 1906. (L. S.)	1592
W. McLees.....	O.	700	8-6½	570	—350	.....	100	1905	(L.)	1593
P. J. Rush.....	D.	275	6	245	—225	.....	15	1905	Hard water.....	1594
D. B. Ledwell.....	C.	272½	5	203	—182	.....	15	1903	Hard water. (L.)	1595
.....do.....	C.	252	5½	220	.....	.....	4	1903	(L.)	1596

b Oil in 24 hours.

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1597	Water	Erath	Stephenville, $\frac{1}{2}$ m. NE. of	Baldwin Gin Co.	E. D. Moore
1598	do	do	Purves, 2 m. N. of	Mrs. Carroll	
1599	do	Fayette	Ammannsville, 1 m. E. of	F. Monk	
1600	do	do	Engle, $1\frac{1}{2}$ m. N. of	Moritz Schwenke	
1601	do	do	Flatonia, $\frac{1}{4}$ m. NW. of	J. C. Bludworth	J. Maresh
1602	do	do	La Grange, 3 m. N. of	Geo. Gerdes	
1603	do	do	Ledbetter, near post-office.	E. P. Sturmer	S. W. Willard
a1604	do	do	Schulenburg	Southern Pacific R. R.	
1605	do	Fisher	Golan	Burt Lester	Judge L. Crow
a1606	do	Fort Bend	Rosenberg, $4\frac{1}{2}$ m. SW. of	C. Hillar	
1607	do	Gillespie	Fredericksburg, 10 m. SE. of	Robert Jenschke	
1608	do	do	do	William Rehfeld	
1609	do	do	Morris Ranch, 1 m. W. of	Charles Morris	Leyendecker & McDougall
1610	do	do	Fredericksburg, $6\frac{1}{2}$ m. SW. of	Max Useney	
1611	Oil	Gonzales	Ottine, $\frac{1}{2}$ m. W. of	J. A. Otto	
1612	Water	do	Ottine	Otto	
1613	do	do	do	J. A. Otto	J. A. Otto
1614	Oil	do	Ottine, 3 m. N. of	do	
1615	Water	do	Wealder, 1 m. N. of	J. C. McVea	
1616	do	do	Wealder	City of Wealder	
1617	do	Gray	Miami, 5 m. S. of	Chas. Christopher	
1618	do	do	Miami, 10 m. SW. of	Thos. O'Loughlin	
1619	Oil	Grimes	Keith, 3 m. SW. of, well No. 1 on Wills farm.	Layne & Bowler	
a1620	Water	Guadalupe	Schertz		
1621	do	Hamilton	Hico, $\frac{1}{4}$ m. S. of	Ed Barret	
1622	do	do	Evant, 1 m. SW. of	Dane Warren	
1623	do	do	Star, 3 m. NE. of	Garrett	
1624	do	do	Star, 5 m. N. of	J. C. Main	
1625	Oil	Hardin	Batson town site, R. C. Duff tract.	R. P. Allen & Co.	R. P. Allen & Co.
1626	do	do	Batson, $1\frac{1}{2}$ m. NNW. of, well No. 5, on Heywood lease.	Crown Oil Co.	
1627	do	do	Batson, $1\frac{1}{2}$ m. N. of, Wood & McRaven lease, Paraffine tract.	do	

a See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
A. M. Moore.....	D.	<i>Ft.</i> 250	<i>In.</i> 5-4	<i>Ft.</i> 225	<i>Ft.</i> .....	.....	Large	1901	(L.).....	1597
B. Oustott.....	D.	278	6	269	.....	.....	.....	.....	Hard water.....	1598
H. C. Iselt.....	D.	205	3	200	- 65	.....	5	1901	Hard water; water at 48 feet. (L.)	1599
Jas. Maresh.....	D.	185	3	.....	+ 41	.....	.....	1901	Sulphur water.....	1600
J. Maresh.....	C.	107	6½	95	.....	.....	40	1905	Water from 31-59 feet and 95-107. (L. S.)	1601
H. C. Iselt.....	D.	280	3	275	- 60	.....	5	1902	Soft water; water at 65 feet.	1602
S. W. Willard.....	C.	184	12	158	-108	.....	.....	1902	Soft water; also at 128 feet. (L.)	1603
L. Bowler.....	M.	720	9½-8½	268	.....	.....	.....	1904	Water sands at 268-284 feet and 690-700 feet. (L.)	1604
Judge L. Crow.....	C.	302	7-5½	302	-200	.....	5	1905	Hard water (gypsum).	1605
I. W. Lawson.....	D.	300	9½	200	- 30	.....	1,000	1904	Water slightly alkaline. (L.)	1606
Thomas Leyendecker.	D.	158	48-6½	145	- 95	.....	4	1900	Hard water.....	1607
.....do.....	D.	136	7-5½	134	- 94	.....	4	1900	Soft water; water at 96 feet.	1608
Leyendecker & McDougall.	C.	1,140	8-6	.....	- 40	.....	125	1898	Water 500-800 feet. (L.)	1609
Thos. Leyendecker.	D.	152	7-5½	146	- 35	.....	5	1900	Soft water; water at 58 and 88 feet.	1610
P. L. Donnelly.....	D.	256	6	155	+ 30	.....	.....	1904	Sulphur water.....	1611
F. P. Donnelly.....	D.	200	6	.....	+ 20	.....	.....	1904	Soft water. (L.).....	1612
J. A. McCullough...	O.	575	6-5	311	.....	.....	.....	.....	Show of oil at 472 feet. (L. S.)	1613
.....do.....	O.	1,310½	6-4	.....	.....	.....	.....	1905	Dry hole; showing of oil at 380-440 feet. (L. S.)	1614
J. Maresh.....	D.	329	4	310	.....	.....	.....	1902	Soft water at 57, 151, 193 feet.	1615
.....do.....	D.	680	6	680	- 21	.....	.....	1902	Good supply of soft water.	1616
Chas. Christopher.	M.	348	4½	330	-330	.....	5	1902	Soft water.....	1617
Thomas O'Loughlin.	M.	422	6	340	-340	.....	10	1904	Soft water. (L.).....	1618
Tom Little.....	M.	800	.....	.....	.....	.....	.....	1905	Unfinished.....	1619
J. P. Benkendorfer.	D.	872	8-6	830	- 50	.....	.....	1903	Salt, sulphur water. (L.)	1620
O. B. LeIwell.....	M.	153	6	31	+ 49	.....	.....	1904	Hard water.....	1621
N. W. Curry.....	D.	152	6	140	-120	.....	3	1904	Soft water.....	1622
Curry & Blackburn.	D.	220	6	210	-190	.....	.....	1904	Soft, containing some magnesia.	1623
N. W. Curry.....	D.	160	6	.....	-140	.....	.....	1904	(L.).....	1624
R. P. Allen.....	O.	904	6-4	.....	.....	.....	.....	1905	Dry hole. (L. S.).....	1625
.....do.....	O.	497	.....	.....	.....	.....	.....	.....	Principal oil sand at 460-480 feet; produced about 4,000 barrels per month. (L.)	1626
W. C. Turnbow....	O.	568	6	.....	.....	.....	.....	1904	Produced about 6,000 barrels per month. (L.)	1627

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1628	Oil.....	Hardin.....	Batson, $\frac{1}{2}$ m. N. of.....	J. W. Ennis.....	J. W. Ennis.....
1629	....do....	....do....	Batson, $1\frac{1}{2}$ m. NW. of, Milhouse farm, well No. 1.	S. Private.....	Texas Drilling Co.
1630	....do....	....do....	Batson, $1\frac{1}{2}$ m. NW. of, well No. 1, on Milholm farm.	W. Weyant.....	.....
1631	....do....	....do....	Saratoga.....	Britton Oil Co.....	Texas Drilling Co.
a1632	....do....	....do....	....do....	Gulf Coast and Santa Fe Rwy.	.....
1633	....do....	Harris.....	Humble, 2 m. NE. of...	W. F. Brice & Co...	T. J. Wood.....
1634	....do....	....do....	Humble, 2 m. NE. of, well No. 1, on Brooks farm.	Coxey Oil Co.....	....do....
a1635	....do....	....do....	Westfield, 3 m. NE. of, well No. 3, Dunn farm.	Turkey Creek Oil Co.	Successful Drilling Co.
1636	....do....	Hamilton.....	Hico, $9\frac{1}{4}$ m. E. of.....	Hico-Iredell Oil Co.	John F. Grogan..
1637	Dry hole	Haskell.....	Haskell, 12 m. E. of...	Harry Bledsoe.....	.....
1638	Water.....	....do....	Haskell, 10 m. W. of...	G. E. Courtney.....	.....
1639	....do....	....do....	Haskell, $1\frac{1}{4}$ m. N. of...	P. McLemore.....	.....
1640	....do....	Hays.....	Kyle, 1 m. NE. of.....	Will. Goos.....	J. E. Donnelly...
a1641	Oil.....	....do....	Kyle, 15 m. SE. of.....	.....	.....
1642	Water.....	....do....	Kyle, $3\frac{1}{2}$ m. NW. of.....	M. W. Rogers.....	J. E. Donnelly....
1643	....do....	....do....	San Marcos, $\frac{1}{2}$ m. W. of.	L. H. Brown.....	.....
1644	....do....	....do....	San Marcos, $\frac{1}{2}$ m. NW. of.	H. E. Brown.....	.....
1645	....do....	Hidalgo.....	Delfina, 9 m. NE. of...	Esteban Garza.....	.....
1646	Oil.....	Houston.....	San Pedro, 10 m. NE. of Crockett, well No. 1, on Z. D. Driskill farm.	East Texas Oil Co.	.....
1647	....do....	....do....	San Pedro, 10 m. NE. of Crockett, well No. 2, on Z. D. Driskill farm.	....do....	.....
1648	Water.....	Irion.....	Sherwood, $8\frac{1}{2}$ m. SW. of.	S. H. Dorman.....	.....
1649	Oil.....	Jack.....	Jacksboro, 10 m. N. of.	Chas. A. Lee (Amber Oil Co.).	.....
a1650	....do....	Jasper.....	Jasper, 14 m. NW. of...	Radium Oil Co....	I. N. Betterson...

a See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Scott Clay.....	M.	1,103	6				b 300	1905	Water sand at 60-480 feet. (L. S.)	1628
E. C. Foster.....	C.	1,134	6-4			b2,000			Water at 72-110 feet; show oil at 772-815, 876-920, 1,090-1,134 feet. (L. S.)	1629
Wm. Brown.....	O.	1,165	4			b 200		1905	Oil in shale from 825-1,165 feet. (L.)	1630
Joe Drouot.....	D.	327						1905	Bowlder stopped drilling. (S.)	1631
	O.							1905	(L.)	1632
Phil. Audrige.....	C.	1,205	6				b 500	1905	Oil rock at 1,188-1,204 feet. (L.)	1633
Fred Chase.....	C.	1,140	4			b 250		1905	Gas sands at 700-800 feet; oil at 1,120 feet. (L.)	1634
Harry A. Roberts.	D.	831	8 $\frac{3}{4}$ -5 $\frac{1}{2}$					1905	No oil; slight show of gas. (L. S.)	1635
John F. Grogan...	C.	721	6 $\frac{3}{4}$ -5					1905	Water 85-275 feet, with head of +12 feet; abandoned. (L.)	1636
G. E. Courtney....	D.	205						1901	Little water at 20 feet. (L.)	1637
.....do.....	O.	137 $\frac{1}{2}$	7 $\frac{1}{2}$ -5 $\frac{1}{2}$	137				1901	Salt water. (L.)	1638
.....do.....	D.	325	8-5 $\frac{1}{2}$					1899	Small yield; water salty, used only for stock in droughts. (L.)	1639
J. E. Donnelly....	C.	366	5 $\frac{1}{2}$	358			10	1902	Water slightly sulphur at 328-366 feet.	1640
Donnelly, Land-halve & Blocker.	D.	1,620	6 $\frac{1}{2}$ -5 $\frac{1}{2}$				Small	1903	Oil at 160-165 and 437-439 feet. (L.)	1641
J. E. Donnelly....	C.	354	5 $\frac{1}{2}$ -4	266			10	1904	Water, hard, at 266-354 feet.	1642
F. P. Donnelly & Monk.	D.	200	6	200	-150				Soft.	1643
J. E. Donnelly....	M.	200	6	200	-150					1644
A. J. Ashworth...	D.	256	6-5	250	- 66			1899	Water salty; some water found at 60 feet.	1645
Joe Lee.....	O.	1,504	6 $\frac{1}{2}$ -2					1904	Signs of oil and gas at 700-800 feet. (L. S.)	1646
.....do.....	O.	1,000	6 $\frac{1}{2}$ -4					1904	(S.)	1647
J. H. Lohmann....	D.	183	6	178	-163		7 $\frac{1}{2}$	1905	Soft water.	1648
	O.	100							Six wells; strongest yields 10 barrels in 24 hours. (L.)	1649
Andrew Williams.	O.	1,520	12-4					1905	Water sand at 720-730 feet; no oil. (L. S.)	1650

b Barrels a day.

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1651	Oil.....	Jefferson.....	Nome, 3 m. W. of.....	Chas. S. Edgar.....	W. R. Osborne...
1652	...do....	...do.....	Beaumont, Spindletop..	W. S. Fairish.....	
1653	Water..	Johnson.....	Egan.....	Perry.....	L. B. & R. E. Wallen.
1654	...do....	Jones.....	Neinda, 6 m. S. of.....	Judge L. Crow.....	
1655	...do....	...do.....	Sinclair, 4 m. SW. of...	Jno. H. Hall.....	Judge L. Crow...
1656	...do....	...do.....	Stamford, 5 m. S. of...	A. E. Duke.....	...do....
a1657	...do....	Johnson.....	Cleburne.....	Gulf, Colorado and Santa Fe Rwy.	J. J. Myers.....
1658	...do....	Kendall.....	Boerne, 5 m. E. of.....	William Able.....	
1659	...do....	...do.....	Boerne, 5 m. NE. of...	Ernest Sixt.....	
1660	...do....	...do.....	Boerne, 3½ m. SE. of...	Henry Cash.....	
1661	...do....	...do.....	Boerne, 3½ m. S. of...	Hy. Leesch.....	
1662	...do....	...do.....	Boerne, 4 m. S. of...	Chas. Perrin.....	
1663	...do....	...do.....	Boerne, 7 m. NE. of...	Ernest Zoeller.....	
1664	...do....	...do.....	Sisterdale, 1 m. N. of...	August Langbein...	
1665	...do....	...do.....	Sisterdale, ½ m. N. of...	...do....	
1666	...do....	...do.....	Waring, 1½ m. S. of...	Ives L. Brown.....	
1667	...do....	Kent.....	Clipper, 2 m. E. of...	S. C. Bilberry.....	
1668	...do....	Kerr.....	Center Point, ¼ m. W. of.	G. P. McCorkle.....	
a1669	...do....	...do.....	Comfort, 2 m. SW. of...	A. D. Bartel.....	
1670	...do....	...do.....	Comfort, 4 m. NW. of...	Otto Heinen.....	
1671	...do....	...do.....	Comfort, 9 m. NW. of...	Ernest Lichs.....	
1672	...do....	...do.....	Comfort, 2½ m. NW. of...	Mrs. Clara Neunhöffer.	
1673	...do....	...do.....	Kerrville.....	J. T. Page.....	
1674	...do....	Kimble.....	Junction City, 8 m. NE. of.	G. D. Tarlton.....	J. S. Yates.....
1675	Water..	King.....	Guthrie, 12 m. from....	S. R. Burnette.....	
1676	...do....	Kinney.....	Brackettville.....	A. J. Vick.....	
1677	...do....	...do.....	Henze, 15 m. SW. of...	Shey Bros.....	
a1678	...do....	Lampasas.....	Lampasas, ¼ m. N. of...	W. B. Abney.....	
1679	Water..	...do.....	Lampasas, 6 m. NE. of...	Wm. Woottan.....	D. Culver, jr.....
1680	...do....	...do.....	Lometa.....	McQuarry.....	
1681	...do....	...do.....	Star, 4 m. SE. of.....	J. Henry.....	
1682	...do....	Lasalle.....	Cotulla, 2½ m. E. of...	Caldwell & Wilson...	
1683	...do....	Lee.....	Giddings, 4 m. E. of...	Wm. Schroeder.....	
1684	...do....	...do.....	Lincoln, 2½ m. N. of...	H. Lochmann.....	

a See detailed record at end of table.

SUMMARY OF DRILLING.

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reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
M. F. Stollard.....	C.	2,000	8-7 $\frac{1}{2}$					1904	Slight showing oil at 0-135, 1,200-1,287, 1,334-1,450 feet; dry hole. (L.)	1651
.....	O.	1,000						1905	(S.)	1652
E. B. Wallen.....	D.	644	7-4	620	-200		500	1905	Sulphur water; supplies boiler for cotton gin.	1653
Judge L. Crow.....	O.	140	6-5 $\frac{1}{2}$	140	-126		1	1900		1654
.....do.....	D.	107	6 $\frac{1}{2}$ -6	90	-60		5	1904	Gypsum water. (L.)	1655
.....do.....	D.	289	6 $\frac{1}{2}$ -5 $\frac{1}{2}$	130	-80		2	1903	Water salty. (L.)	1656
J. J. Myers.....	C.	1,200	6	1,004			160	1903	Water at 435-450, 500-525, 1,004-1,060 feet.	1657
Emil Menn.....	D.	209	6	206	-189			1905		1658
Richard Schwarz.....	D.	157						1905	(S.)	1659
Emil Menn.....	D.	342	6	335	-292			1904	Hard water	1660
Ado. Kaiser.....	M.	342	6	332	-277			1903	do	1661
Amiel Menn.....	O.	334	6	305	-270		3	1902	do	1662
Richard Schwarz.....	D.	220	6	200	-180		20	1902	Soft water	1663
.....do.....	D.	175	6 $\frac{1}{2}$	160	Flows.	2		1890	Sulphur water	1664
.....do.....	D.	200	6	175				1890	Water, 50-100 feet. (L.)	1665
Ives L. Brown.....	O.	315	7-5 $\frac{1}{2}$	290	-100		5	1898	Hard water. (L.)	1666
S. C. Bilberry.....	O.	168	6	130	-126			1902	Hard, slightly salt; water; also at 164 feet.	1667
Moore & Burney.....	O.	350	6		-30		60	1902	Water, odorless, hard; water at 90 and 140 feet also.	1668
Adolph Bartel.....	O.	226	6	222	-45		8		(L.)	1669
.....do.....	D.	154	7-5 $\frac{1}{2}$	151	+8	6		1903	Hard, iron-bearing water; first water bed at 139 feet. (L.)	1670
Chas. Spinnrath.....	O.	250	7-5 $\frac{1}{2}$	250	-18		6	1897	Water contains iron	1671
Albert Herbst.....	M.	157	6 $\frac{1}{2}$ -4 $\frac{1}{2}$	147	+15	12		1904		1672
J. T. Page.....	O.	184	6		-30				Iron-bearing water	1673
J. S. Yates.....	C.	216	6	185				1904	Some oil	1674
J. J. Mitchell.....	D.	255	7	250	-224		8	1903	Gypsum water. (L.)	1675
W. F. Fowler.....	D.	355	7 $\frac{1}{2}$				30	1902	Hard water	1676
Howell & Co.....	M.	476	7	365			10	1903	Hard water. (L.)	1677
American Well and Prospecting Co.	O.	2,012	10 $\frac{1}{2}$ -6		Flows.	10	100	1903	Sulphur water at 540 feet; salt water at 1,110 and 1,560 feet. (L.)	1678
.....	C.	515	5	135			9	1900	Hard water; a little salt water at 390 feet.	1679
J. O. Lindsey.....	D.	227	6	186	-55		3	1901	Water soft; some water at 27 and 76 feet. (L.)	1680
N. W. Curry.....		100	6	80	-75			1903	Hard water. (L.)	1681
Robbins Bros.....	D.	265	8-6	88	-30		65	1904		1682
S. W. Willard.....	D.	165	12	159	-125			1901	Soft water; good flow.	1683
B. Dube.....	D.	112	8	100				1903		1684

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1685	Water..	Lasalle.....	Nunnsville, 2 m. NE. of..	Mrs. Jennie Dodd.....	.....
*1686	Oil.....	Liberty.....	Dayton, J. B. Harrison tract, NW. $\frac{1}{4}$ S. $\frac{1}{2}$ sec. 125, Houston and Texas Central R. R.	Sun Company.....	.....
1687	do.....	do.....	Dayton, West Liberty, well No. 2, NW. $\frac{1}{4}$ of sec. 125, Houston and Texas Central R. R.	do.....	.....
1688	Water..	Llano.....	Click, 3 m. NW. of.....	J. H. Click.....	.....
1689	do.....	do.....	do.....	J. R. Clark.....	.....
1690	do.....	do.....	Oxford, 9 m. SE. of.....	J. B. Buie.....	.....
1691	do.....	McCulloch.....	Rochelle, $3\frac{1}{2}$ m. SW. of..	A. L. Miers.....	.....
1692	do.....	McLennan.....	Crawford, near post-office.	Citizens Water Co.....	.....
1693	do.....	do.....	Crawford, 5 m. SE. of.....	Henry Cole.....	W. L. Cass.....
1694	do.....	do.....	Crawford, 4 m. NE. of.....	Mrs. G. P. Dodd.....	do.....
1695	do.....	do.....	McGregor, 1 m. N. of.....	Otto Heering.....	.....
1696	do.....	do.....	McGregor, $\frac{1}{2}$ m. SW. of.....	O. P. Lawson.....	.....
1697	Oil.....	McMullen.....	Crowther, $1\frac{1}{4}$ m. S. of.....	Boston and Texas Co.....	.....
1698	do.....	do.....	do.....	do.....	.....
1699	do.....	Medina.....	Devine, $2\frac{1}{4}$ m. S. of.....	Eli Burch.....	.....
*1700	Oil.....	do.....	Dunlay, $4\frac{1}{2}$ m. SW. of, on Geo. Haas ranch.	Rio Bravo Oil Co.....	.....
1701	Water..	Mills.....	Mullin.....	Faireman & Deer.....	.....
1702	Oil.....	Montgomery.....	Tamina.....	Dick Naylor Oil Co.....	J. H. Lee.....
1703	do.....	Nacogdoches.....	Nacogdoches, 16 m. SE. of.	Williams Bros.....	.....
*1704	do.....	Navarro.....	Corsicana, 5 m. E. of, well No. 12, on B. T. Barry farm, Powell field.	Corsicana Petroleum Co.....	Corsicana Petroleum Co.....
1705	do.....	do.....	Corsicana, 11 m. E. of.....	Houston Oil Co.....	Sanders & Sutherland.....
*1706	do.....	do.....	Corsicana, 12 m. NE. of, Hodges farm, well No. 1.	do.....	R. C. Sanders.....
1707	Water..	Nueces.....	Banquete, 3 m. SW. of.....	R. Driscoll.....	.....
*1708	do.....	do.....	Corpus Christi, 15 m. W. of.....	do.....	.....
1709	do.....	do.....	Robstown.....	do.....	.....
1710	do.....	do.....	Robstown, 7 m. SE. of.....	do.....	.....
1711	do.....	do.....	Robstown, 6 m. S. of.....	do.....	.....

* See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
S. W. Willard.....	D.	<i>Ft.</i> 112	<i>In.</i> 12	<i>Ft.</i> 110	<i>Ft.</i> — 34	<i>Gals.</i>	<i>Gals.</i>	1901	Soft water; good flow. (L.)	1685
.....	O.	1,763	.....	.....	.....	.....	.....	1905	Slight show of oil at 1,700 feet; dry hole. (L.)	1686
.....	O.	775	.....	.....	.....	b400	.....	1905	Water at 420-440 feet; oil at 775 feet; show of oil at 200-420, 458-478, 504-514, 658-676, and 676-745 feet. (L.)	1687
J. R. Clark.....	D.	180	6½	.....	.....	.....	6	1899	Soft water.....	1688
.....do.....	O.	126	6½	.....	— 30	.....	7	1899	do.....	1689
.....do.....	D.	120	6	90	— 75	.....	7	1903	Very hard water.....	1690
Joe Guinn.....	M.	200	6	180	—152	.....	.....	1901	Hard water; 2 wells..	1691
A. F. Damon.....	D.	926	9-6½	920	+ 30	40	60	.....	Soft water. (L.).....	1692
W. L. Cass.....	C.	460	.....	450	Flows.	.....	.....	1905	.....	1693
.....do.....	C.	434	.....	420	— 3	.....	.....	1905	Water at 130-140 feet..	1694
Jacob H. Smith.....	D.	515	6½-5	505	— 5	.....	.....	1903	Sulphur water.....	1695
W. L. Cass.....	D.	509	5-4	500	.....	.....	.....	1905	Sulphur water. (L.)	1696
Sam Crowther.....	D.	1,728	12-4	.....	.....	400	.....	1902	Well No. 2, on J. M. Martin farm; about 30 barrels oil per 24 hours; 4 flows of salt water; oil sand at 1,728 feet. (L.)	1697
.....do.....	D.	1,340	6	.....	+ 30	100	.....	1902	Principal water beds at 640, 1,100, and 1,300 feet; flow is salt sulphur water.	1698
Eli Burch.....	O.	920	6	.....	— 10	.....	90	1904	Water at 384 feet; sulphur water at 800 feet, with show of gas. (L.)	1699
Milo M. Garvin.....	D.	1,000	10-6	.....	.....	.....	.....	1903	Dry hole. (L.).....	1700
J. C. Stearns.....	D.	107	6	107	— 19	.....	5	1898	.....	1701
J. H. Lee.....	C.	1,288	10	.....	.....	.....	.....	1905	(L. S.).....	1702
J. M. Thresher.....	D.	1,304	.....	.....	.....	.....	.....	1905	(S.).....	1703
C. P. Wilson.....	O.	810	6½-4	.....	.....	.....	b10	1905	(S.).....	1704
.....	C.	1,184	.....	.....	.....	.....	.....	1905	(L. S.).....	1705
W. C. Sutherland..	C.	1,129	6½-4	.....	.....	.....	.....	1905	Gas sand at 754-891, 964-985 feet; dry hole. (L. S.)	1706
Thos. Fowler.....	D.	296	5½-4½	283	— 50	.....	50	1905	Salt water at 75-85 feet; soft fresh water at 283-296 feet (L. S.)	1707
Thos. Fowler and Lee Long.	D.	656	7	630	.....	.....	25	1905	(L. S.).....	1708
Thos. Fowler.....	D.	645	.....	.....	.....	.....	.....	1905	(S.).....	1709
.....do.....	D.	828	5½-4½	814	— 28	.....	40	1904	Good water.....	1710
.....do.....	D.	220	5½-4½	208	.....	.....	25	1904	Water salty. (L.)...	1711

b Barrels a day.

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1712	Water	Parker.....	Weatherford, $\frac{1}{2}$ m. SW. of.	Water, Light, and Ice Co.	
1713	do	Pecos.....	Fort Stockton, 7 m. N. of.	Mrs. F. W. Young..	
1714	do	do.....	Longfellow, 4 m. E. of.	Chas. Downie.....	
1715	do	Roberts.....	Miami, $5\frac{1}{2}$ m. S. of.	C. F. Christopher..	
1716	do	do.....	Miami, 10 m. SW. of.	Thos. Olofin.....	
1717	do	do.....	Miami, 12 m. N. of.	Jno. J. Huhn.....	
1718	do	San Saba.....	Cherokee, 6 m. W. of.	Lee Baker.....	
1719	do	do.....	Cherokee.....	D. S. Hanna.....	
1720	do	Schleicher.....	Eldorado, 11 m. NW. of.	J. W. Alexander..	
1721	do	do.....	Eldorado.....	Robt. Bailey.....	
1722	do	do.....	Eldorado, 10 m. E. of.	Sam Bates.....	
1723	do	do.....	Eldorado, 7 m. W. of.	M. Davis.....	
1724	do	do.....	Eldorado, 3 m. SW. of.	T. P. Dorris.....	
1725	do	do.....	Eldorado.....	Eldorado Water-works Co.	
1726	do	do.....	Eldorado, 9 m. E. of.	John Hill.....	
1727	do	do.....	Eldorado, 8 m. N. of.	J. L. Jones.....	
1728	do	do.....	Eldorado, 6 m. NW. of.	J. H. Lohmann.....	
1729	do	do.....	Eldorado, 8 m. E. of.	J. E. Mills.....	
1730	do	do.....	Eldorado, 2 m. SW. of.	W. Oliver.....	
1731	do	do.....	Eldorado, $\frac{1}{2}$ m. NE. of.	W. B. Silliman.....	
1732	do	do.....	Eldorado, 5 m. NW. of.	E. E. Stricklen.....	
1733	do	do.....	Eldorado, 8 m. S. of.	R. M. Thomson, jr..	
1734	do	do.....	Eldorado, 18 m. N. of.	A. T. Wright.....	
1735	do	Scurry.....	Wheat, 2 m. W. of.	H. Northcutt.....	
1736	do	Starr.....	Hebbronville, 40 m. S. of.	Amancio Garcia.....	
1737	do	do.....	Hebbronville, 40 m. SE. of.	W. M. Jones.....	
1738	do	do.....	Hebbronville, 35 m. SW. of.	W. W. Jones.....	
1739	do	do.....	Hebbronville, 25 m. S. of.	do.....	
1740	do	do.....	Roma.....	M. Guerra.....	
1741	do	do.....	do.....	do.....	
1742	do	do.....	do.....	do.....	
1743	do	do.....	do.....	do.....	
1744	do	do.....	Sanisidro, 10 m. NW. of.	Jesus Izaquirre.....	A. J. Ashworth..
1745	do	do.....	Sanisidro, 10 m. W. of.	R. E. Margo.....	
1746	do	Stonewall.....	Aspermont, 16 m. NW. of.	Jas. Chriswell.....	
1747	do	do.....	Oriana, 4 m. W. of.	S. B. Goodrich.....	S. B. Goodrich..
1748	do	Sutton.....	Sonora, 18 m. S. of.	A. R. Cauthorn.....	

* See detailed record at end of table.

reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
.....	M.	450	10	402	-310	.....	.....	1903	3 wells, 6, 8, and 10 inches; city water supply. (L.)	1712
C. F. Young.....	.....	140	5½	140	+ 1½	62½	.....	1903	Alkaline water; said to be only flowing well in county. (L.)	1713
W. F. Fowler.....	D.	519	7½	.....	.....	.....	.....	1905	(L. S.)	1714
L. G. Christopher..	D.	337	6-4½	320	-320	.....	4	1902	Soft water. (L.)	1715
.....	M.	422	5½	330	.....	.....	10	1905	.....do.....	1716
Christopher Bros..	D.	299	.....	.....	.....	.....	.....	1905	(S.)	1717
.....	M.	227	.....	.....	.....	.....	.....	1905	(S.)	1718
Clyde R. Cook.....	D.	200	.....	.....	- 5	.....	12	1904	(L. S.)	1719
J. W. Fletcher.....	O.	347	6	342	-237	.....	10	1905	Water at 252 feet; water soft.	1720
Ernest Barns.....	O.	387	.....	.....	.....	.....	.....	.....	5 wells, 330-387 feet deep; good water; good supply.	1721
R. L. Brooke.....	D.	327	6½	200	.....	.....	5	.....	Soft water.	1722
.....	.....	340	6	340	- 40	.....	20	.....	.....	1723
C. A. Stark.....	D.	355	6	350	-295	.....	60	1902	Hard water.	1724
Geo. P. Lanier.....	M.	355	8	325	-225	.....	40	1896	Water at 250 feet; town supply; soft, fine water; not lowered by pumping.	1725
R. L. Brooks.....	D.	248	6½	242	-100	.....	7	1902	Soft water. (L.)	1726
.....	O.	360	6	.....	-260	.....	8	.....	Soft water.	1727
J. H. Lohmann.....	O.	327	7	317	- 51	.....	7½	1903	Water at 280; also at 327 feet.	1728
.....	O.	300	8	280	-170	.....	.....	1891	Hard; also at 170 feet.	1729
T. P. Dorris.....	O.	332	7	332	-300	.....	12	1902	Slightly alkaline.	1730
.....	M.	400	8	350	-350	.....	15	1900	Soft water.	1731
Behrens.....	O.	300	7	280	-260	.....	15	1885	Soft water; also at 200 feet.	1732
J. H. Morrison.....	O.	376	8-6	376	.....	.....	10	1900	Hard water.	1733
L. H. Fletcher.....	D.	261	6	256	.....	.....	40	1905	Hard water; some water at 180 feet.	1734
H. Northcutt.....	.....	207	6	202	-162	.....	7	1901	Soft water. (L.)	1735
W. M. David.....	D.	162	6	162	- 86	.....	7	1905	Hard water.	1736
.....do.....	D.	149	6	149	-114	.....	.....	1904	Salty water; water at 30 feet.	1737
.....do.....	D.	220	6-5	220	- 30	.....	7	1904	Water salty	1738
.....do.....	D.	123	6-5	123	- 30	.....	7	1904	.....	1739
.....do.....	D.	114	6	114	- 34	.....	7	1904	Hard water.	1740
.....do.....	D.	250	6	.....	- 70	.....	.....	1904	Small flow; abandoned; soft water.	1741
.....do.....	D.	252	6	.....	- 92	.....	7	1904	Soft water.	1742
.....do.....	D.	277	6	277	- 80	.....	7	1905	Hard water.	1743
A. J. Ashworth.....	D.	294	6	290	- 74	.....	.....	1902	Soft water; water found also at 80 feet.	1744
.....do.....	D.	270	5¾	265	- 77	.....	.....	1905	Soft water; water at 242 feet.	1745
C. D. McReynolds..	D.	178	6½	175	-160	.....	3	1905	Hard water. (L.)	1746
.....do.....	D.	176	6	.....	.....	.....	3	1905	(L. S.)	1747
John Watson.....	O.	256	6	250	.....	.....	10	1903	Hard water.	1748

Summary of well drilling

TEXAS—Continued.

No.	Kind of well.	County.	Location.	Owner..	Contractor.
1749	Water..	Sutton.....	Sonora, $\frac{1}{2}$ m. E. of.....	Hurst Bros.....	
1750	...do...	...do.....	Sonora, 20 m. SE. of	S. L. Merck.....	S. L. Merck.....
1751	...do...	...do.....	Sonora, $\frac{1}{2}$ m. NE. of.....	T. D. Newell.....	
1752	...do...	...do.....	Sonora, near post-office.	Jno. Patten.....	
1753	...do...	...do.....	Sonora, 11 m. SE. of	O. T. Ward.....	
1754	...do...	Tarrant.....	Mansfield, 4 m. S. of.....	G. T. Brewer.....	S. S. Godwin.....
1755	...do...	Tom Green.....	Christoval, 10 m SE. of	E. Boehrens.....	
1756	...do...	Travis.....	Austin.....	Edward Seeling.....	
1757	...do...	...do.....	Austin, 9 m. N. of.....	Walter Tips.....	
1758	...do...	Valverde.....	Del Rio, 20 m. NE. of	Landon Rose.....	
1759	...do...	...do.....	Sonora, 28 m. SW. of.....	W. M. Whitehead.....	
1760	Water..	Ward.....	Monahans, 8 m. N W. of	J. T. McKelroy.....	
1761	...do...	Washington.....	Healey.....	Healey Cotton Co ..	M. Nichols.....
1762	...do...	Webb.....	Laredo.....	D. H. Randolph.....	
1763	...do...	Wichita.....	Iowa Park, 9 $\frac{1}{2}$ m. N. of	A. J. Schulz.....	
1764	Oil .....	...do.....	Wichita Falls, 3 m. NE. of .....	...do.....	E. B. Cass.....
a1765	...do...	Williamson.....	Taylor, 8 m. E. of.....	Chas. S. Stauffer	J. Maresh.....
a1766	Water..	Zavalla.....	Carrizo Springs, 22 m. N. of	Pratt & Hoge.....	E. A. Archibald ..

UTAH.

a1767	Salt Lake.....	Salt Lake City.....	Frank Yeager
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VERMONT.

1768	Water..	Chittenden	Winooski, 1 m. NE. of ..	Village of Winooski.	J. P. Hoadley
1769	...do...	Windsor.....	North Hartland.....	Artesian Well and Supply Co.

a See detailed record at end of table.

SUMMARY OF DRILLING.

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reported in 1905—Continued.

TEXAS—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield-per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Hurst Bros.....	O.	300	8-6	290	.....	.....	30	1905	Hard water; water at 150 feet.	1749
S. L. Merck.....	O.	327	6	316	.....	.....	10	1901	Hard water.....	1750
E. F. Vander Stucken.	D.	300	8	300	.....	.....	50	1895	1 of 4 wells; used for town supply; soft water.	1751
Jno. Hunt.....	M.	150	6	150	.....	.....	.....	1900	Also at 100 feet.....	1752
N. Smith.....	M.	173	8	166	.....	.....	.....	1888	Hard water.....	1753
L. C. Turner.....	C.	320	4	60	- 30	.....	20	1905	Soft water; hard water from 85-95 and 170-230 feet. (L.)	1754
E. Boehrens.....	O.	400	6-4½	360	-150	.....	.....	1902	Fresh water at 169 feet; 2 gallons per minute; salty and alkaline water at 360 feet; not used; strong flow; abandoned.	1755
Hugh McGillivray.	M.	2055	10-4	2055	+ 50	40	.....	1901	Well at Driskill Hotel; water sulphur bearing; water also taken from 500 feet.	1756
J. E. Donnelly.....	D.	502	6-5	490	-200	.....	4½	1904	Hard water; seep of water at 140 feet.	1757
W. B. Rountree...	M.	387½	6	380	-250	.....	25	1902	Hard water; weak seep at 250 feet. (L.)	1758
F. M. Wyatt.....	D.	784	.....	480	-480	.....	10	.....	.....	1759
G. B. Devoll.....	D.	124	6	124	- 75	.....	40	1903	Water at 75 and 90 feet; water soft; used by 3,000 cattle daily.	1760
John Booth.....	D.	145	6½-5	120	.....	.....	.....	1905	Water from 65-105 feet. (L.)	1761
Robt. Campbell...	M.	505	5½	435	- 34	.....	75	1900	Soft water.....	1762
.....	O.	220	7-4	.....	.....	.....	.....	.....	Dry hole.....	1763
E. B. Cass.....	D.	425	6½	.....	.....	.....	.....	1904	Fresh water at 80 feet; salt at 290 and 400 feet. (L.)	1764
J. Maresh.....	C.	1500	5	.....	.....	.....	.....	1903	Dry hole. (L.).....	1765
E. A. Archibald....	C.	910	8	720	+ 2½	1,000	1905	Water at 550, 650, and 720 feet; slightly sulphur bearing. Temperature 90°. (L.)	1766

UTAH.

Frank Yeager.....	C.	650	3	+ 30	50	1767
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VERMONT.

J. P. Hoadley.....	C.	453	8	270	-100	65	1905	Soft; lowered 200 feet by pumping. (L. S.)	1768
.....	.....	350	.....	.....	.....	.....	3	1904	.....	1769

Summary of well drilling

VIRGINIA.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1770	Water	Augusta	Staunton, U. S. Hospital.	United States	
1771	do	Gloucester	Eagle Point, 2 m. E. of	Joseph Bryand	
1772	do	do	Sassafras, 2 m. SE. of	F. K. Weaver	
1773	do	King William	Westpoint, $\frac{1}{2}$ m. S. of	Dr. Geo. W. Richardson.	
1774	do	do	Westpoint, $\frac{1}{2}$ m. S. of	do	
1775	do	do	Westpoint	E. Wilkinson	E. Wilkinson
1776	do	Matthews	Matthews, near post-office.	Matthews County	
1777	do	Prince William	Manassas, $\frac{1}{2}$ m. E. of	Corporation of Manassas.	
1778	do	Wythe	Wytheville	Wytheville Ice and Dairy Plant.	

WASHINGTON.

1779		Adams	Lind, 9 m. SW. of	E. Gaskell	
1780	Water	do	Lind, 6 m. NW. of, sec. 28, T. 18, R. 33.	A. C. Jansen	
1781	do	do	Lind, $\frac{1}{2}$ m. NE. of, sec. 12, T. 17, R. 33.	James Nealson	
1781a	do				
a1782	do	Benton	Carley, $\frac{1}{4}$ m. NE. of, sec. 6, T. 4, R. 24.	S. L. Gaines	W. McCausland and M. F. Cochran.
1783	do	Douglas	Sec. 9, T. 13, R. 30	H. J. Caldwell	
1784	do	do	Ephrata, 12 m. S. of, sec. 4, T. 19, R. 26.		
1785	do	do	Ephrata, 10 m. W. of	G. W. Ingraham	
1786	do	do	Krupp, 5 m. S. of, T. 21, R. 30.	Fred Hose	
1787	do	do	Petersburg, 5 m. SW. of, sec. 19, T. 17, R. 30.	Peter Troutman	T. P. Brown
1788	do	do	Petersburg, 9 m. S. of, sec. 34, T. 17, R. 31.	H. M. Howard	
1789	do	do	Quincy, 13 m. SE. of, sec. 36, T. 19, R. 24.	Coon	J. A. Wilburn
1790	do	do	Quincy, 3 m. SW. of, T. 20, R. 23.	Adam Weher	do
1791	do	Garfield	Pomeroy, 9 m. SE. of	Wes. Fitzsimmons	
a1797	do	Jefferson	Fort Flagler	United States	
1798		Lincoln	Sec. 32, T. 24, R. 31	A. Wilson	
1799	Water	do	Odessa, 14 m. NW. of, sec. 10, T. 23, R. 32.	W. H. Lazimer	
a1800	do	Wallawalla	Walla Walla, 16 m. NW. of, sec. 2, T. 8, R. 34.	Martin Marback	

a See detailed record at end of table.

reported in 1905—Continued.

VIRGINIA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Sydnor Well and Pump Co.	M.	426	.....	395	.....	.....	.....	1905	(L.)	1770
Miller Bros. and H. E. Shimp.	D.	981	6-1	981	.....	30	.....	1904	Soft water; also at 650 feet.	1771
H. E. Shimp.....	D.	550	3-1	535	.....	.....	.....	1905	Water at 17 and 350 feet.	1772
.....do.....	O.	366	4-1½	366	+ 30	30	.....	1905	Water at 220 feet; also soft; temperature 60°. (L.)	1773
H. E. Shimp.....	D.	366	4-2	360	+ 35	70	.....	1905	Water at 120 feet; main supply soft. (L.)	1774
E. Wilkinson.....	O.	330	2½	160	.....	.....	.....	1884	One of many wells in town; sulphur water at 120 feet; soft magnesia water at 160 and 330 feet.	1775
H. E. Shimp.....	D.	817	3-1	817	+ 6	.....	.....	1905	Soft; water at 110 feet.	1776
A. R. Thomas.....	M.	532	8-6	487	- 58	.....	120	1905	Test well for town supply; soft water. (S.)	1777
.....	.....	300	.....	.....	.....	.....	.....	1905	"Show of oil" at 175 feet. (L.)	1778

WASHINGTON.

T. P. Brown.....	D.	483	8-5½	463	- 403	.....	5	.....	Soft water; also at 380 feet.	1779
Jack Dougherty...	M.	528	6	520	- 458	.....	6	1902	Soft.....	1780
H. M. Howard.....	M.	286	8	121	- 20	.....	16½	1902	Soft; also at 61 feet; city supply.	1781
W. McCausland ...	D.	250	.....	.....	.....	.....	.....	1905	(S.).....	1781a
W. E. Thomas and M. F. Cochran.	M.	432	8-4	.....	- 38	.....	.....	1905	Water at 50, 314, and 315 feet. (L. S.)	1782
F. M. Ebrel.....	D.	375	.....	.....	.....	.....	.....	1905	(L. S.).....	1783
D. Chaffee.....	D.	185	6	178	.....	.....	8	1905	(L. S.).....	1784
.....do.....	D.	174	.....	.....	.....	.....	.....	1905	(S.).....	1785
W. H. Place.....	.....	214	5½	209	- 174	.....	50	1903	Soft water. (L.).....	1786
T. P. Brown.....	C.	288.6	5½	.....	.....	.....	5	1905	(L. S.).....	1787
.....do.....	D.	320	6	285	- 250	.....	5	1903	Water at 160 feet; supply soft. (L.)	1788
J. A. Wilburn	C.	192	5	140	.....	.....	.....	1905	(L. S.).....	1789
.....do.....	C.	400	5	372	- 337	.....	.....	1905	(L.).....	1790
W. E. McDaniels ..	D.	180	6	150	- 150	.....	60	1902	Soft water; not lowered by pumping.	1791
.....	M.	1,462	8-6	.....	- 60	.....	.....	1903	(L.).....	1797
H. H. Wilburn	D.	206	.....	.....	.....	.....	.....	1904	(S.).....	1798
C. A. Simpson.....	D.	222	5½	207	- 14	.....	.....	1905	Soft; also at 55 feet	1799
W. S. McCausland.	D.	350	5½	340	- 250	.....	10	1905	(L. S.).....	1800

Summary of well drilling

WEST VIRGINIA.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
a1801	Gas.....	Cabell.....	Culloden, 2 m. S. of....	Buena Oil and Gas Co.	Weiler Bros.....
1802	Oil.....	Gilmer.....	Sand Fork, on bank of Little Kanawha River, A. E. Messinger farm.	Piney Run Oil and Gas Co.	Ira W. Logan....
a1803	Gas.....	Harrison.....	Bridgeport, 3 m. SE. of Simpson district, well on Geo. Lancaster farm.	Hope Natural Gas Co.	J. C. Gormley & Co.
1804	.....do.....	.....do.....	Clarksburg, 4 m. W. of, Clark district, on B. S. Reynolds farm.	.....do.....	N. D. Goe & Son..
1805	Oil.....	.....do.....	Rinehart, 1 m. S. of....	N. S. Burton & Co..	Chambers & Co...
a1806	Gas.....	Marion.....	Farmington, 2 m. N. of, well No. 1, on Sarah A. Town farm, Manning district.	Fayette County Gas Co.	G. A. Hatzel.....
1807	.....do.....	Mingo.....	Marcum, 4 m. E. of, well No. 1, on Rhoda Brewer farm.	Triple State Oil and Gas Co.	E. W. Hammond.
1808	.....do.....	.....do.....	Marcum, 2 m. E. of, well No. 1, on Vinson farm.	.....do.....	.....do.....
1809	Oil.....	Monongalia.....	Jollytown, 2½ m. SW. of, White farm.	Forest Oil Co.....	.....do.....
a1810	.....do.....	.....do.....	Well No. 11, on Wilson heirs farm.	South Penn Oil Co..	W. G. Allender...
1811	Water..	Tucker.....	Thomas, 1¼ m. SW. of..	Davis Coal and Coke Co.	.....do.....
1812	.....do.....	Tyler.....	Middlebourne.....	S. G. Pyle.....	Watkins & Co....
a1813	Oil.....	Wayne.....	Dunlow, ¾ m. N. of, Napier farm, well No. 1.	Deep Sand Oil and Gas Co.	Weiler Bros.....
1814	Gas.....	Wetzel.....	Earnshaw, 2½ m. W. of..	Carnegie Co.....	Cochran & Funk..
a1815	.....do.....	.....do.....	Far, 1 m. S. of, well No. 1, on Windham farm.	Hope Natural Gas Co.	J. P. Fishel.....
1816	Oil.....	.....do.....	Smithfield, 3 m. NE. of, well No. 3, on Perry Hall farm.	South Penn Oil Co..	N. S. Burton.....

a See detailed record at end of table.

reported in 1905—Continued.

WEST VIRGINIA.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
	C.	2,128	13-6 $\frac{1}{8}$	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>	1905	(L. S.).....	1801
Joseph Cunningham and Frank Binkard.	O.	2,871						1905	Show of oil at 1,750, 1,960, and 2,646 feet; dry hole. (L. S.)	1802
	O.	3,271	10-6 $\frac{1}{8}$					1905	Dry hole. (L.).....	1803
	O.	3,032	10-6 $\frac{1}{8}$					1903	Initial pressure, 710 pounds at end of 60 minutes; volume, 9,439,280 cubic feet in 24 hours. (L.)	1804
W. J. Bernier.	D.	3,302	10-5 $\frac{1}{8}$					1904	Water at 1,700 feet; oil at 3,287 feet, in Gordon sand; 70 barrels first 24 hours. (L.)	1805
H. J. Hatzel and H. A. Griffin.	O.	2,878	10-4					1905	Gas at 1,890 and 1,915 feet in Big Injun, at 2,340 feet in 50-foot, and at 2,858 in fifth sand; yield in 24 hours, 20,000,000 cubic feet. (L.)	1806
E. W. Hammond and W. A. Smith.	C.	1,513	13-8					1905	Soft water at 50-60 feet; salt, 610-627 feet; 700,000 cubic feet gas first 24 hours. (L. S.)	1807
Hammond and Callihan.	C.	1,712	13-8					1905	Initial pressure, 250 pounds. (L.)	1808
	M.	2,890						1890	(L.).....	1809
	O.	3,658		2,645			b 12	1905	Deepest productive oil well. (L.)	1810
R. W. Collett.	D.	300						1905	(S.).....	1811
H. E. Van Camp.	C.	210	6-5	26	-18			1905	Good volume of water. (L.)	1812
F. S. and G. J. Weiler.	C.	1,172	13-6 $\frac{1}{8}$	1,150			b 4	1905	Fresh water, 160-175 feet; salt water filled hole at 620 feet; showing of oil at 590-600 feet; small showing of gas at 1,084-1,094 feet. (L. S.)	1813
M. R. and E. L. Mohr.	D.	3,363						1905	Dry hole; little gas at 1,040, 2,350, 3,190, and 3,295 feet. (L. S.)	1814
T. L. Dunlap and W. H. King.	D.	2,820	13-5					1905	Water at 1,690 feet; gas at 2,820 feet; in Gordon sand; initial pressure, 800 pounds. (L.)	1815
W. J. Bernier.	D.	3,596					b 30	1904	Pittsburg coal at 1,440 feet; oil pay, 3,560-3,563 feet. (L.)	1816

b Barrels a day.

Summary of well drilling

WISCONSIN.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1817	Water..	Cook.....	Cragin.....	Chicago, Milwaukee and St. Paul R. R.	.....
1818	...do...	Fond du Lac....	Fond du Lac, 8 m. SE. of.	W. Gray.....	P. Roughen.....
1819	...do...	...do.....	Fond du Lac, 5 m. S. of.	Emil Thrun.....	...do.....
1820	.....	...do.....	Waupun.....	City of Waupun....	W. F. Sealy.....
1821	.....	Grant.....	Hazel Green, 2 m. E. of, sec. 30, T. 1, R. 1.	Crawford Mining Co.	.....
1822	Water..	...do.....	Fennimore, $\frac{1}{2}$ m. N. of, sec. 19, T. 6, R. 2.	Village of Fennimore.	.....
1823	...do...	Kenosha.....	Ranney, $\frac{1}{2}$ m. SE. of, sec. 16, T. 1, R. 22.	Chicago and Northwestern R. R.	W. H. Gray & Bro.
1824	...do...	La Crosse.....	Onalaska.....	City of Onalaska...	Barney Olsen....
1825	...do...	Manitowoc.....	Kiel, sec. 30, T. 17, R. 4..	Village of Kiel.....	O'Connor Well Drill Co.
1826	...do...	...do.....	Manitowoc, 3 m. SW. of, sec. 31, T. 19, R. 24.	Northern Grain Co.	Frank W. Gray..
1827	...do...	Marquette.....	Montello, $\frac{1}{2}$ m. S. of....	Christ. Tagatz.....	Neck Bros.....
1828	...do...	Milwaukee.....	Milwaukee post-office, $\frac{1}{4}$ m. SW. of.	Pfister & Vogel Leather Co.	Peter Bauer and W. H. Gray & Bro.
1829	...do...	...do.....	Milwaukee, sec. 26, T. 7, R. 21.	Schlitz Brewing Co.	Peter Bauer.....
1830	...do...	Outagamie.....	Appleton, 6 m. N. of, sec. 26, T. 22, R. 17.	George Batzler.....	I. W. Hills.....
1831	...do...	...do.....	Appleton, 7 m. N. of, sec. 22, T. 22, R. 17.	John Bly.....	...do.....
1832	...do...	...do.....	Appleton, 10 m. NW. of, sec. 29, T. 22, R. 17.	Hughman.....	...do.....
1833	...do...	...do.....	Appleton, 7 m. N. of, sec. 33, T. 22, R. 17.	Louis Jarhcow.....	...do.....
1834	...do...	...do.....	Appleton, 8 m. SW. of, sec. 11, T. 20, R. 16.	Aug. Mehling.....	...do.....
1835	...do...	...do.....	Appleton, 7 m. N. of, sec. 23, T. 22, R. 17.	A. Preston.....	...do.....
1836	...do...	...do.....	Appleton, T. 21, R. 17...	Reinholdt Lebric..	...do.....
1837	...do...	...do.....	Dale, 3 m. SW. of, sec. 30, T. 21, R. 15.	L. Gillinger.....	...do.....
1838	...do...	...do.....	Dale, 2 m. NW. of.....	J. Mayer.....	...do.....
1839	...do...	...do.....	Dale, sec. 19, T. 21, R. 15.	Chas. Rasler.....	...do.....
1840	...do...	...do.....	Dale, 3 m. SW. of, sec. 32, T. 21, R. 15 E.	Paul Selle.....	...do.....
1841	...do...	...do.....	Dale, 3 m. SW. of, sec. 32, T. 21, R. 15.	Mrs. W. Thornton..	...do.....
1842	...do...	...do.....	Dale, 2 m. W. of, sec. 29, T. 21, R. 15.	Oren Vaughn.....	...do.....
1843	...do...	...do.....	Hortonville, 1 m. SW. of, sec. 5, T. 21, R. 15.	Mrs. F. Borchert...	...do.....
1844	...do...	...do.....	Hortonville, 4 m. NE. of, sec. 20, T. 22, R. 16.	Peter Carroll.....	...do.....
1845	...do...	...do.....	Hortonville, 2 m. E. of, sec. 6, T. 21, R. 16.	Ed. Jack.....	...do.....

* See detailed record at end of table.

reported in 1905—Continued.

WISCONSIN.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
Wm. Trentlage.....	D.	<i>Ft.</i> 400	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>	1905	(L. S.).....	1817
P. Roughen.....	C.	104	5	103	— 18		18	1905	(L. S.).....	1818
.....do.....	C.	264	5-4	255			16	1905	Water at 101-106, and 255-264 feet; hard. (L. S.)	1819
.....	C.	800	6-3					1887	(L. S.).....	1820
A. D. Stoner.....	M.	212	6					1905	Water at 48 feet. (L. S.)	1821
Frank Cowan.....	M.	800	12-6	300	—300			1905	Soft water.....	1822
Steve Hanlon.....	O.	710	12-8						Unfinished. (L. S.)..	1823
Barney Olsen.....	C.	457			— 11		350	1905	Water at 148-270 and 335-455 feet. (L. S.)	1824
.....	M.	471	12-10	89	— 26		200	1905	Water at 89-454 feet. (L. S.)	1825
Wm. Weber and Wm. Trentlage.	D.	986	10-7		— 22		350	1905	Hard water at 230-237, 422-450, 498-505, and 735-763 feet; sulphur water at 398-410 feet. (L. S.)	1826
Neck Bros.....	C.	145	2	138	+ 6½	22		1903	Soft water. (L.).....	1827
.....	O.	1,690	10-8			95		1905	(L. S.).....	1828
Henry Knaack.....	D.	108	6	80	— 37		20	1904		1829
Chas. W. Celow.....	C.	229	4					1903	(L.).....	1830
H. Ross.....	C.	148	4					1903	(L.).....	1831
.....do.....	C.	110	4				18	1902	(L.).....	1832
.....do.....	C.	187					2	1902	(L.).....	1833
I. W. Hills.....	C.	190½	4	188				1905	(L.).....	1834
Chas. Celow.....	C.	184	4	180				1903	Hard water. (L.)....	1835
H. Ross.....	C.	101	4					1904	(L.).....	1836
F. H. Fitzlaff.....	C.	165½	4					1901	(L.).....	1837
.....do.....	C.	103	4	94	— 39			1902	Soft water. (L.).....	1838
A. F. Strehlow.....	C.	110	4					1903	(L.).....	1839
.....do.....	C.	143	4		— 28			1903	(L.).....	1840
F. H. Fitzlaff.....	C.	141	4		—115			1900	(L.).....	1841
Fred Ewert.....	C.	210	4					1902	Soft water. (L.).....	1842
F. H. Fitzlaff.....	C.	150	4					1902	(L.).....	1843
H. Ross.....	C.	167	4					1902	(L.).....	1844
F. H. Fitzlaff.....	C.	141	4					1901	(L.).....	1845

Summary of well drilling

WISCONSIN—Continued.

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1846	Water..	Outagamie.....	Hortonville, 3 m. E. of, sec. 32, T. 22, R. 16.	Lamm Estate.....	I. W. Hills.....
1847	...do...	...do.....	Hortonville, 3 m. SE. of, sec. 1, T. 22, R. 15.	Jerome Lewis.....	...do.....
1848	...do...	...do.....	Hortonville, 3 m. E. of, sec. 32, T. 22, R. 16.	George Werner.....	...do.....
1849	...do...	...do.....	Medina, 1 m. NE. of, sec. 24, T. 21, R. 15.	Fred Raprager.....	...do.....
1850	...do...	...do.....	New London, 1 m. S. of, sec. 19, T. 22, R. 15.	W. Lathrop.....	...do.....
1851	...do...	...do.....	Shiocton, 1 m. NE. of, sec. 33, T. 23, R. 16.	A. Bates.....	...do.....
1852	...do...	...do.....	South Kaukauna.....	John Coppers.....	J. J. Faust.....
1853	...do...	...do.....	Shiocton 2 m. SE. of, sec. 33, T. 23, R. 16.	Wesley Williams.....	I. W. Hills.....
1854	...do...	...do.....	Shiocton, 3 m. E. of, sec. 34, T. 23, R. 16.	Thomas Peep.....	...do.....
1855	...do...	...do.....	Shiocton, 4 m. SE. of, sec. 3, T. 22, R. 16.	H. Vogal.....	...do.....
1856	...do...	Polk.....	Osceola, sec. 3, T. 14, R. 19	D. Shea.....	P. Roughen.....
1857	...do...	Racine.....	Caledonia, sec. 18, T. 4, R. 22.	.....	.....
1858	...do...	...do.....	Corliss, 2 m. NW. of, sec. 20, T. 3, R. 22.	A. D. Beveer.....	H. Jorgensen.....
1859	...do...	...do.....	Racine, 2½ m. SW. of, sec. 35, T. 3, R. 22.	Thos. Acklam.....	...do.....
1860	...do...	Walworth.....	Lake Geneva, 3 m. W. of.	M. A. Ryerson.....	W. J. Miller's Sons.
1861	...do...	Washburn.....	Spooner, sec. 3, T. 39, R. 12.	Village of Spooner..	.....
1862	...do...	Waupaca.....	New London 2 m. S. of, sec. 25, T. 22, R. 14.	John Cooney.....	I. W. Hills.....
1863	...do...	...do.....	Fremont, 1 m. NE. of...	David Leiby.....	...do.....
1864	...do...	...do.....	Readfield, 3 m. SW. of, sec. 24, T. 21, R. 14.	A. Schartean.....	...do.....
1865	...do...	Winnebago.....	Keenah, 7 m. NW. of, sec. 11, T. 20, R. 16.	Herman Ludeman.....	...do.....
1866	...do...	...do.....	Larsen, 2½ m. NW. of...	John Helgeson.....	...do.....
1867	...do...	...do.....	Larsen, 4½ m. W. of, sec. 22, T. 20, R. 15.	Mattson School.....	...do.....
1868	...do...	...do.....	Neenah, 9 m. NW. of, sec. 3, T. 20, R. 16.	Wm. Hopp.....	...do.....
1869	...do...	...do.....	Oshkosh, 6 m. N. of, sec. 23, T. 19, R. 16.	Emil Luebke.....	...do.....
1870	...do...	...do.....	Oshkosh, 7 m. NW. of, sec. 19, T. 16, R. 32.	A. D. Orr.....	...do.....
1871	...do...	...do.....	Oshkosh, 9 m. N. of, sec. 10, T. 19, R. 16.	Frank Vosberg.....	...do.....
1872	...do...	...do.....	Winchester, sec. 24, T. 20, R. 15.	George Tomson.....	...do.....

reported in 1905—Continued.

WISCONSIN—Continued.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
		<i>Ft.</i>	<i>In.</i>	<i>Ft.</i>	<i>Ft.</i>	<i>Gals.</i>	<i>Gals.</i>			
A. Blackwood.....	C.	109	4					1902	(L.).....	1846
F. Fitzlaff.....	C.	161	4		- 97			1902	(L.).....	1847
H. Ross.....	C.	143	4		- 73			1901	(L.).....	1848
F. H. Fitzlaff.....	C.	168	4		- 68			1902	(L.).....	1849
A. F. Strehlow.....	C.	197	4						(L.).....	1850
I. W. Hills.....	C.	135	4					1903	(L.).....	1851
M. G. Faust.....	D.	255		240		3		1905	Water at 130 feet. (S.)	1852
F. H. Fitzlaff.....	C.	102	4					1902	(L.).....	1853
H. Ross.....	C.	144	4					1900	(L.).....	1854
.....do.....	C.	130	4		- 83			1901	Hard water. (L.)	1855
P. Roughen.....	C.	100	5	100	- 2		20	1905	(L. S.).....	1856
H. Jorgensen.....	D.	108	4	100			30	1905	(L. S.).....	1857
.....do.....	C.	179	4				33	1905	(L. S.).....	1858
.....do.....	C.	175	4	173			60	1904	(L. S.).....	1859
L. C. and W. E. Trow.	D.	343	5		-165		20	1905	Water from below 255 feet. (L. S.)	1860
S. Swanson.....	M.	217	12	217	Flows.	200	312	1905	Water at 60-215 feet. (L. S.)	1861
G. H. Fisher.....	C.	118	4					1902	(L.).....	1862
F. W. Ewert.....	C.	181	4		- 15			1901	Soft. (L.).....	1863
F. H. Fitzlaff.....	C.	277		169	+ 17			1900	.....do.....	1864
A. F. Strehlow.....	C.	217	4	217	- 60			1903	(L.).....	1865
E. E. Brown and Wallace Earle.	C.	108	4						(L. S.).....	1866
	C.	138		138	- 20			1905	Soft. (S.).....	1867
A. F. Strehlow.....	C.	119						1902	(L.).....	1868
F. H. Fitzlaff.....	C.	147	4					1901	Hard water. (L.)	1869
.....do.....	C.	151	6-4	150	- 10			1902	.....do.....	1870
.....do.....	C.	217	4		- 35			1901	(L.).....	1871
.....do.....	C.	136	4		- 85			1901	(L.).....	1872

*Summary of well drilling***WYOMING.**

No.	Kind of well.	County.	Location.	Owner.	Contractor.
1873	Water..	Albany.....	Laramie, 1 m. SE. of....	Acme Plaster Co.	J. J. McCutcheon.
1874	....do....	....do.....	Laramie, 3 m. W. of....	S. W. Downie.....	....do.....
1875	....do....	....do.....	Laramie $\frac{1}{2}$ m. E. of....	University of Wyoming.	....do.....
1876	....do....	Carbon.....	Rawlins.....	I. C. Miller.....	....do.....
1877	....do....	Laramie.....	Wheatland, 4 m. NE. of.	J. M. Stull.....	....do.....

reported in 1905—Continued.

WYOMING.

Driller.	Authority.	Depth.	Diameter.	Depth to principal water or oil supply.	Height of water.	Yield per minute.		Year completed.	Remarks.	No.
						Flow.	Pump.			
J. J. McCutcheon...	C.	952	7 $\frac{1}{8}$ -4 $\frac{1}{2}$	940	+70	25	.....	1904	Water at 600 and 800 feet; water, soft. (L.)	1873
.....do.....	C.	400	7 $\frac{1}{8}$ -5 $\frac{1}{8}$	395	-20	.....	200	1888	Water at 60, 190, and 380 feet; soft water. (L.)	1874
W. W. Broso.....	C.	1,000	5 $\frac{1}{8}$	987	.....	30	.....	1895	Water at 20 and 550 feet; soft water. (L.)	1875
J. J. McCutcheon...	C.	1,000	5 $\frac{1}{8}$	130	.....	.....	.....	1895	Pumps 2 gallons per hour. (L.)	1876
.....do.....	C.	283	7 $\frac{1}{8}$ -5 $\frac{1}{8}$	.....	.....	.....	60	1905	Water at 80-90 and 280-285 feet. (L. S.)	1877

DETAILED RECORDS.

The records which follow were selected from the great number listed in the preceding table because of the stratigraphic information which they afford. They do not always represent the deepest borings reported from a particular section, nor are they necessarily records of wells from which samples have been received by the Survey. They were chosen mainly with the view of supplying data for those localities in which information is deficient. In discriminating among well records within a given area those which showed the most care in recording naturally received preference. The logs are reproduced mainly as given by the driller, although obvious mistakes were corrected and occasional changes made in the nomenclature, such as the substitution of "shale" for "soapstone" where it was clear that the former was the proper term. In some cases where no logs accompanied the samples, but the latter had been taken at fairly close intervals, records were compiled from them. Where the driller's notes and the samples have varied decidedly as to the character of the rocks at a given depth, the original name is followed by a description of the sample in parentheses. The Survey has attempted to publish only reliable records, but, owing to the absence of any opportunity for verification, can not guarantee them. It is hoped, however, that they will be of aid to drillers by showing the character of the rocks, the types of rig used, the depth to the oil or water bearing horizon, the size and length of casing probably needed, etc. Companies or individuals prospecting in unfamiliar territory should also find among these records information that will be of service to them in many ways.

In some of the logs the samples are described in detail, even though the exact depths of the beds are not given. This is for the purpose of showing the general character of the rocks. While drillers employ certain terms which are descriptive and, if properly used, sufficiently exact, such as "slate," "shells," "shelly slate," etc., yet usage varies enough to make records containing such entries puzzling. Again, rocks are not always properly differentiated; "sand" is frequently any rock gritty enough to wear the bit, hence limestone and sandstone are confused, which results in great difficulties in stratigraphic correlations. On the other hand, while a sample of pulverized rock is of little or no value unless the location of the well and the depth are known, and while in drilling with a standard rig pieces of crumbly beds may fall and mingle with the pieces of the bed on which the drill is pounding, and with a hydraulic rig other contamination of samples is likely, yet a series of samples carefully taken from top to bottom of a well, even if unaccompanied by the driller's notes, gives evidence of high reliability. As a bed deeply buried often differs much from its outcrop, samples from a number of deep wells are described in some detail.

Geologic nomenclature for sedimentary rocks.

System.	Series.	Groups and formations.
Quaternary.....	{Recent.....	<i>South Atlantic and Gulf Coastal Plain.</i> Columbia loam and gravel.
	{Pleistocene.....	
	{Pliocene.....	{Lafayette gravel. Shell Creek limestone. Caloosahatchee limestone.
	{Miocene.....	
Tertiary.....	{Oligocene.....	{Oakville group. Pascagoula group. Chesapeake sands.
		{Oak Grove marl. Chipola sand. Chattahoochee group. Vicksburg group.
		{Jackson group. Cockfield group. Claiborne group. Wilcox group. Midway group.
		<i>Texas and Great Plains region.</i>
Cretaceous.....	{Gulf.....	{Montana group. Colorado group. Dakota group.
	{Comanche.....	{Washita group. Fredericksburg group. Trinity sand.
Jurassic.....		<i>North Atlantic Coastal Plain.</i> {Arundel sands. Patuxent clays.
Triassic.....		{Brunswick sandstone. Lockatong shale. Stockton sandstone.
Carboniferous.....	{Permian.....	<i>New York-Pennsylvania region.</i> Dunkard sandstone.
	{Pennsylvanian.....	
	{Mississippian.....	{Monongahela formation. Conemaugh formation. Allegheny formation. Pottsville conglomerate.
		{Mauch Chunk shale. Pocono sandstone.
Devonian.....		{Chemung sandstone. Portage sandstone. Hamilton shale. Marcellus shale. Onondaga limestone. Schoharie grits. Oriskany sandstone.
		{Helderberg limestone. Salina formation. Niagara group. Clinton shale. Medina sandstone.
Silurian.....		{Eden-Lorraine shale} Utica shale. } Hudson group.
Ordovician.....		{Trenton limestone. Chazy limestone. Beekmantown limestone.
Cambrian.....	{Saratogan.....	Potsdam sandstone.
	{Acadian.....	Braintree slate.
	{Georgian.....	Chickies quartzite.
Algonkian.....		
Archean.....		

So far as the evidence warrants, the various logs show the geologic age of the beds and formations penetrated. In the choice of formation names the usage of the Survey is followed. Some local or State names will no doubt be missed, owing to the substitution of place names for the older descriptive names, which, however apt for the formation at the place where first bestowed, may be absolutely misleading if applied to beds of the same age not far distant. The above table shows the stratigraphic divisions (formations, groups, series, and systems) used in classifying the sedimentary rocks in certain parts of the United States.

The term formation, as here used, means any rock or succession of rocks having such extent and such peculiarities that it can be distinguished over a considerable tract of country and treated as a unit in mapping. Thus a formation may be a persistent bed but a foot or two thick, or it may be a succession of beds 10,000 feet thick. With the progress of investigation the number of formation names has become great. The list is continually increasing, though some names are replaced by others as accumulating evidence shows that certain names are entitled to preference. Also, since a limestone bed in one locality may have been deposited at the same time as a sandstone bed in another and since the succession of changes of deposition may have differed widely, a formation in one locality may represent half a dozen in another. Hence a table of formation and group names (several formations make a group) for the whole country would be long and complicated.

ALABAMA.

13. Well near Hazelgreen, Madison County.

[Well begun and completed in 1905. Authority, H. B. Conover, driller. Geologic correlations by E. O. Ulrich.]

The red clay at and near surface has resulted from the decay of the underlying limestone (the Tullahoma), which is of Mississippian age. The underlying shales and limestones, in downward order, are Chattanooga shale (Devonian), Helderberg limestone and shale (Silurian), Fernvale limestone and shale (Ordovician), Leipers limestone and shale (Ordovician), "Trenton" limestone (Ordovician). These formations were determined by careful study of the fossils found in their outcrops. The well drillings show few marked differences below the Chattanooga shale, the only striking formation being the Fernvale red limestone and shale.

Record of well on D. A. Moseley farm, in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$, sec. 19, T. 1, R. 1.

Tullahoma:	Feet.
Red clay.....	0- 20
Clay and rock.....	20- 67
Hard gray flinty limestone.....	67- 93
Chattanooga:	
Hard black shale.....	93-103

Helderberg:	Feet.
Hard black shale and gray flinty limestone.....	103-112
Hard brownish cherty limestone.....	112-117
Hard black shale and gray and brownish cherty limestone.....	117-135
Hard brownish cherty limestone and gray shale.....	135-139
Brownish cherty limestone with black shale.....	139-148
Soft gray limy shale.....	148-152
Hard greenish shaly limestone and black shale.....	152-156
Hard gray limestone and greenish limy shale.....	156-165
Clifton:	
Soft gray shaly limestone and calcareous shale.....	165-170
Hard dark-gray and greenish calcareous shale and white and gray shaly limestone.....	170-182
Hard dark calcareous shale and gray and brownish limestone.....	182-190
Hard gray and brownish limestone and black calcareous shale.....	190-196
Hard dark-gray and brownish limestone.....	196-200
Hard gray and greenish limestone.....	200-204
Hard dark-gray limestone.....	204-212
Soft gray and greenish limestone.....	212-220
Soft gray and greenish limestone and gray shale.....	220-230
Fernvale:	
Soft gray limestone and reddish shale.....	230-245
Soft greenish and reddish limestone and brown shale.....	245-250
Hard greenish and reddish shaly limestone.....	250-255
Soft greenish and reddish limestone and reddish calcareous shale.....	255-260
Hard gray limestone and greenish and reddish shaly limestone.....	260-265
Leipers to "Trenton:"	
Hard gray limestone.....	265-275
Hard gray and brownish shaly limestone.....	275-285
Hard gray and brownish limestone and calcareous shale.....	285-290
Hard gray limestone.....	290-320
Soft gray shaly limestone.....	320-350
Soft gray limestone.....	350-391
Rig used, standard. Diameter of well, 8 and 6½ inches. Show of oil at 148 feet. Show of gas at 190 feet.	

19. Well at Thomaston, Marengo County.

[Well begun May 23, 1905; completed July 7, 1905. Authority, John I. Hawk, contractor and driller. Samples preserved. Geologic correlations checked by E. C. Eckel.]

The surface formation is the Columbia yellow loam (Pleistocene). All the underlying formations are of Cretaceous age. They are the Ripley sands, the Selma chalk, and the Eutaw sands and sandstones. The record is of interest as showing the total thickness of the Selma chalk, or "Rotten limestone."

Record of well of Southern Cotton Oil Company.

Columbia:	Feet.
Yellow soil and subsoil and sand; sand water-bearing.....	0- 40
Ripley:	
Alluvium, sand, and clay with cemented shells and gravel at 45 feet.....	40- 60
Brownish limy sand.....	60-100
Gray limy sand with sandstone at 119 feet.....	100-120

Selma:	Feet.
Medium soft gray marl and sand.....	120- 180
Medium soft gray marl, fossiliferous in places and in places containing pyrite, the formation growing more sandy toward the bottom.....	180- 980
Hard marl and sand rock.....	980-1,000

Eutaw:	
Soft gray limy micaceous sand.....	1,000-1,040

Rig used, jet. Diameter of well, 4 inches from 0 to 720 feet; 3 inches from 720 to 1,040 feet. Well barely flows; pumps 15 gallons a minute from a depth of 50 feet.

20. Well 1 mile east of Granite, Mobile County.

[Well begun November 14, 1905; completed December 4, 1905. Authority, John L. Ford, driller. Samples preserved. Geologic correlations by E. C. Eckel.]

This well starts in recent deposits and penetrates clays and sands of late Tertiary (Pliocene) age that are classified as Grand Gulf formation.

Record of well of Alabama Port Company.

Recent:	Feet.
Soft black mud with shells.....	0- 35
Grand Gulf:	
Hard yellow clay.....	35- 95
White sand and gravel.....	95-210
Hard green clay.....	210-250
Fine white sand.....	250-285
Hard green clay.....	285-340
Gray sand—water bearing; flows 35 gallons per minute.....	340-389
Hard green clay.....	389-440
Gray sand—water bearing; flows 135 gallons per minute; static head, + 40 feet.....	440-550

Rig used, jet. Diameter of well, 4 inches. The water from the bed at 440 to 550 feet was too salty to be potable, so the well was abandoned and another sunk to the 340-foot sand.

ARIZONA.

35. Well near Phoenix, Maricopa County.

[Well begun February 22, 1905; completed March 27, 1905. Authority, C. W. Goodman, superintendent United States Indian school. No samples.]

The formations penetrated by this well comprise clay, sand, and "cement," the latter being sand cemented by carbonate of lime, forming a more or less sandy limestone. The whole series partly fills an old rock valley through which Salt River now flows. A summary of the geology of Salt River Valley and a detailed account of the character of the waters developed by wells are given in Water-Supply and Irrigation Paper No. 136, "Underground waters of the Salt River Valley," by W. T. Lee.

Record of well at United States Indian school, 3 miles northeast of Phoenix.

	Feet.
Soil and reddish cement.....	1- 46
Clay and cement.....	46- 60
Cement (pinkish sandy limestone).....	60- 65
Pinkish sandy clay.....	65- 68
Gravel—water-bearing stratum in an adjoining well.....	68- 70
Cement (pinkish sandy and limy clay).....	70- 73
Clay and fine gravel.....	73- 78
Gravel, with small chunks of limestone.....	78- 90

	Feet.
Honeycomb sand rock.....	90- 95
Limestone (pink, limy clay).....	95-100
Sand and small gravel—second water-bearing stratum.....	100-105
Pinkish limy and clayey sandstone.....	105-123
Pinkish soft limy and sandy clay.....	123-147
Soft red clay and limestone.....	147-162
Gravel—third water-bearing stratum.....	162-165
Soft limestone with streaks of soft clay (sample is red sandy clay).....	165-180
Cemented sand, mostly lime rock, with streaks of clay.....	180-185
Sand—fourth water-bearing stratum.....	185-198
Clay and sand.....	198-200

Rig used, cable. Diameter of well, 8 inches; length of casing, 200 feet. Casing perforated, 165 to 195 feet.

ARKANSAS.

62. Well near Fulton, Hempstead County.

[Well begun October 16, 1905; completed October 26, 1905. Authority, Charles E. Hudson, contractor. No samples. Geologic correlations by A. C. Veatch.]

This well starts in the weathered surface of the Arkadelphia clay, penetrates that formation, and strikes the water-bearing beds in the Nacatoch sand. The Arkadelphia clay and the Nacatoch sand are of Cretaceous age.

The geology of southern Arkansas is described in Professional Paper No. 46, "Geology and underground water resources of northern Louisiana and southern Arkansas," by A. C. Veatch.

Record of well in the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 7, T. 13, R. 25, 6 miles northeast of Fulton.

	Feet.
Arkadelphia:	
Soft red and dark clay.....	20- 40
Hard black, blue, and gray clay.....	40-165
Hard gray clay with layers of limestone.....	165-220
Nacatoch:	
Clay and rock.....	220-285
Sandstone, sand, and clay.....	285-300
Sandstone and sand.....	300-320

Diameter of well, 2 inches. Water-bearing strata at 285 to 320 feet; main supply from 320 feet. Water rises within 26 feet of surface.

CALIFORNIA.

92. Well near Alvarado, Alameda County.

[Well begun September, 1904; completed October, 1904. Authority, W. H. Haley, driller. No samples.]

This well is situated in the valley between two ridges of the Coast Range in which lies San Francisco Bay. The beds of sand, gravel, and clay penetrated were brought down from the Mount Diablo Range and deposited in recent or Pleistocene time as alluvial fans in the valley or as deltas beneath a former extension of San Francisco Bay.

Record of well 2 miles north of Alvarado.

	Feet.
Blue mud.....	0- 20
Blue clay.....	20- 22
Yellow clay and gravel.....	22- 71
Coarse sand.....	71- 74
Yellow clay.....	74- 80

	Feet.
Yellow sandy clay.....	80- 95
Blue sandy clay.....	95-106
Blue clay.....	106-115
Blue cement clay.....	115-136
Blue clay.....	136-143
Blue sand.....	143-147
Blue joint clay.....	147-150
Blue clay.....	150-160
Blue sand.....	160-170
Cement gravel.....	170-172
Washed gravel.....	172-182
Yellow clay.....	182-194
Yellow sand.....	194-198
Blue silt.....	198-220
Blue clay.....	220-237
Gravel.....	237-242
Yellow clay.....	242-253
Blue silt.....	253-265
White limestone.....	265-269
Hard sand.....	269-275
Blue sand.....	275-281
Gravel.....	281-293
Yellow clay.....	293-294
Gravel.....	294-310
Yellow clay.....	310-350
Limestone.....	350-364
Sand and gravel.....	364-371
Yellow clay.....	371-425

Rig used, hand tools. Diameter of well, 12 inches. Water-bearing strata at 71-74, 143-147, 160-170, 194-198, 237-242, 269-293, 294-310, and 364-371 feet. The supply of water obtained was small and the well was considered a failure.

94. Well near Coalinga, Fresno County.

[Well begun April 26, 1905; completed August 1, 1905. Authority, Besley Lefevèr, contractor and driller. No samples.]

The oil-bearing horizons in the main Coalinga field occur at the base of a great series of sandstones, conglomerates, shales, and clays which range from the lower Miocene to the upper Pliocene.

Record of well in the N. $\frac{1}{2}$ NW. $\frac{1}{4}$ sec. 7, T. 20, R. 15, 6 miles northwest of Coalinga.

	Feet.
Soft gray sand rock.....	0- 40
Hard yellow conglomerate.....	40- 150
Soft blue clay.....	150- 170
Hard gray sand rock.....	170- 180
Soft sand, water bearing; first water.....	180- 190
Conglomerate full of hard pebbles.....	190- 250
Soft sandy black shale.....	250- 275
Sand with hard streaks; water-bearing.....	275- 300
Sand and blue clay; water-bearing.....	300- 350
Very hard gray sand rock.....	350- 353
Soft brown shale.....	353- 375
Soft sand; water-bearing.....	375- 385

	Feet.
Soft blue clay.....	385- 450
Soft shale and blue clay.....	450- 560
Soft sand; water-bearing.....	560- 585
Soft blue clay mixed with sand.....	585- 640
Hard gray sand rock.....	640- 700
Soft black sand with gravel; water-bearing.....	700- 710
Soft gray sand and blue clay.....	710- 770
Soft, tough blue clay.....	770- 825
Soft sand and gravel; contains sulphur water.....	825- 880
Soft blue clay.....	880-1,010
Hard blue sandy clay.....	1,010-1,030
Very hard gray rock.....	1,030-1,038
Soft, tough blue clay.....	1,038-1,190
Hard black sandy shale.....	1,190-1,295
Soft sand, carrying some oil.....	1,295-1,315
Sand containing black sulphur water; last water in well.....	1,315-1,340
Hard gray sand rock.....	1,340-1,425
Very hard dark flinty rock.....	1,425-1,440
Hard black sandy shale.....	1,440-1,500
Soft brown shale.....	1,500-1,530
Soft sand, oil-bearing.....	1,530-1,550
Blue shale.....	1,550-1,573
Sand—pay-oil sand.....	1,573-1,595
Very hard sandstone.....	1,595-1,615
Soft blue shale.....	1,615-1,630

Rig used, standard: Diameter of well, 10, 8, and 6 inches. Initial yield, 600 barrels in twenty-four hours.

95. Well near Bakersfield, Kern County.

[Well completed July 3, 1901. Authority, Milo M. Garvin, driller. No samples.]

The formations penetrated comprise beds of sandstone, sand, clay, and shale of lower Miocene age, the whole series representing sediments brought down from the mountains to the east. The oil-bearing horizons in the Kern River field have been defined, but the logs of wells a short distance apart show great variations and no attempt has been made to differentiate the beds into distinct formations.

Record of Orient Oil Company's well No. 2, sec. 30, T. 28, R. 28.

	Feet.
Brown wash sand, firm enough to stand up.....	0- 420
White water sand containing fresh water.....	420- 495
Blue clay and sand.....	495- 550
White sand; water-bearing.....	550- 562
Blue clay.....	562- 575
Brown sand.....	575- 600
Light sand.....	600- 610
Dark sand.....	610- 614
Blue clay.....	614- 620
Light sand.....	620- 630
Blue clay.....	630- 655
Brown sand.....	655- 695
Light sand with shells.....	695- 710
Blue clay.....	710- 712
Brown sand.....	712- 724

	Feet.
Blue clay; landed 10-inch drive pipe at 736 feet to shut off fresh water from oil sand.....	724- 745
Brown sand; show of oil.....	745- 746
Blue clay.....	746- 752
Sand and shells.....	752- 765
Light shells.....	765- 773
Light sand; show of gas and oil.....	773- 790
Blue clay.....	790- 800
Light sand; show of oil.....	800- 805
Blue clay.....	805- 822
Brown sand; show of oil.....	822- 825
Blue clay.....	825- 840
Brown sand; show of oil and gas.....	840- 855
Blue clay.....	855- 870
Light sand; show of oil and gas.....	870- 925
Brown shale.....	925- 946
Light sand; oil-bearing.....	946- 982
Brown sand; oil bearing at 982-990 and 1,005-1,024 feet.....	982-1,024
Blue clay.....	1,024-1,030
Light sand; oil-bearing.....	1,030-1,077
Brown shale.....	1,077-1,094
Blue clay.....	1,094-1,105
Brown sand; oil-bearing.....	1,105-1,111
Light sand; oil-bearing.....	1,111-1,130
Blue clay.....	1,130-1,132
Light sand.....	1,132-1,142
Shells and gravel; oil-bearing.....	1,142-1,147
Light sand; oil-bearing.....	1,147-1,178
Blue clay.....	1,178-1,180

Casing perforated from 1,163 to 1,030 feet, 8 inches apart. Initial production, 180 barrels per day.

105. Well at Orange, Orange County.

[Well begun and completed July, 1904. Authority, A. K. Small, superintendent Orange city water system. No samples.]

This well is outside the original artesian area of the eastern coastal plain region of southern California. The many wells put down draw their supply from a common source—the saturated sands and gravels lying between the Puente Hills and the sea. These beds are of recent age and were deposited in a bay that extended up Santa Ana River Valley. A long list of wells and a general account of the conditions governing the underground supply of this area are given in Water-Supply Paper No. 137, "Development of underground waters in the eastern coastal plain region of southern California," by W. C. Mendenhall.

Record of well 1 mile east of Orange post-office.

	Feet.
Gravel.....	0- 40
Clay.....	40- 80
Cement gravel.....	80- 90
Clay.....	90-120
Gravel, with some water.....	120-130
Clay.....	130-158
Gravel; water-bearing.....	158-166
Clay.....	166-184
Gravel; water-bearing.....	184-190

	Feet.
Clay	190-234
Gravel	234-244
Clay	244-250
Gravel; water-bearing	250-280
Clay	280-306
Gravel; water-bearing	306-327
Clay	327-377

Rig used, cable. Diameter of well, 12 inches. Main supply of water from 250 to 280 feet. Completed well pumps 200 gallons per minute, lowering water 60 feet from its level of 106 feet below surface.

107. Well in San Luis Obispo County.

[Well begun April, 1904; completed in 1904. Authority, Fred G. Plummer. No samples.]

This well is situated in Carriso Plain, an arid upland west of the main easternmost ridge of the Coast Range. The rocks penetrated are of upper Miocene age.

Record of well in sec. 4, T. 32, R. 19.

	Feet.
Yellow clay	0- 50
Hard sandy shale; water-bearing	50- 55
Light clay	55- 70
Fossil shells; water	70- 80
Yellow clay	80- 90
Hard blue sandstone	90-155
White sandstone	155-183
Blue shale	183-191
Blue clay	191-211
Blue sandy shale	211-291
Hard white sandstone	291-386
Soft sandstone	386-401
Hard sandy shale	401-476
Hard blue sandstone	476-481
Blue shale	481-511
Sandstone	511-531
Blue shale	531-541
Sandstone; water-bearing	541-561
Blue shale	561-635
Gray sandstone	635-640
White sandstone; water-bearing	640-700
Coarse gravel; large flow of water	700-720
Blue sandy shale	720-765

Elevation of well about 2,500 feet.

166. Well near Sunnyvale, Santa Clara County.

[Well begun January 17, 1905; completed February 14, 1905. Authority, George A. Free, contractor and driller. Samples preserved.]

The beds of sand, clay, and gravel penetrated by this well represent material brought down from the mountains to the south by streams flowing into San Francisco Bay and laid down in alluvial fans or in deltas. Individual beds vary considerably in thickness within short distances and are not persistent, so that logs of neighboring wells often show notable differences. Two water-bearing zones are recognized, however, the upper yielding water by pumping and the lower giving flows. The water from the lower zone is often notably pure.

Record of well in Rancho Pastoria de las Borregas, 1½ miles north of Sunnysvale.

	Feet.
Adobe and yellow clay with water gravel at 12-14 and 18-24 feet.....	0- 26
Gravel; water-bearing.....	26- 34
Soft light and dark blue clay with water-bearing gravel at 81-83 feet.....	34-150
Soft yellow clay with gravel.....	150-178
Gravel; water-bearing; flow at surface 50 gallons per minute.....	178-182
Dark blue clay.....	182-234
Blue quicksand.....	234-250
Soft yellow clay.....	250-270
Yellow sand and gravel, with some water.....	270-281
Soft yellow clay.....	281-300
Dark and light blue clay.....	300-340
Soft yellow clay.....	340-358
Sand and gravel; water bearing; flow of 150 gallons per minute at surface.....	358-360

Rig used, rotary hand tools. Diameter of well, 7 inches. Flows 200 gallons per minute. Casing perforated at 178 to 182 feet and also, to admit water from last gravel bed, at 21 feet from bottom.

172. Well near Portersville, Tulare County.

[Well begun June 12, 1905; completed June 24, 1905. Authority, H. M. Lee, contractor and driller. Samples preserved.]

The beds of clay and sand in which this well is sunk represent material deposited in a fresh-water lake of which Tulare Lake is a shrunken remnant. The beds are of Pleistocene age.

Record of well in sec. 18, T. 22, R. 28, ¼ miles south of Portersville.

	Feet.
Black soil.....	0- 40
Red clay.....	40- 50
Soft grayish, brownish, and reddish clay.....	50-110
Sand and gravel with pebbles 2 inches in diameter and larger; water-bearing.....	110-120
Soft, sticky yellow shale or clay.....	120-155
Quicksand (silt and fine and coarse sand); water-bearing.....	155-160

Rig used, California. Diameter of well, 11 inches. Casing of No. 18 iron plate, riveted, perforated for 20 feet at bottom. Well pumped by single-action 7-inch by 34-inch pump, driven by gasoline engine. Yield, 135 gallons per minute. Water is very soft. Temperature, 72° F.

174. Well near Ventura, Ventura County.

[Well begun and completed in 1905. Authority, Mound Water Company, owner. Samples preserved.]

The gravels, sands, and clays penetrated by this well are of marine origin and of Pleistocene age.

Record of well 5 miles east of Ventura.

	Feet.
Gravel.....	0- 52
Sand.....	52- 62
Greenish clay.....	62-230
Dark clay.....	230-287
Coarse sand.....	287-290
Granite pebbles and boulders.....	290-312
Sand and gravel.....	312-490

COLORADO.

184. Well near Florence, Fremont County.

[Well begun July 31, 1905; completed October 16, 1905. Authority, R. G. Brown and T. S. Harrison, owners. No samples. Geologic correlations by N. H. Darton.]

This well is in an artesian area in an embayment into the Rocky Mountain Front Range. The formations penetrated are of Cretaceous age. The light-blue clay from 18 to 210 feet is the Pierre clay and shale; the light limestone from 210 to 250 feet is part of the Niobrara; the light limestone at 780 to 810 feet is the Timpas; and the light sand from 810 to 825 feet is the top of the Carlile formation.

Record of Brown and Harrison well No. 1, in the SW. $\frac{1}{4}$ sec. 26, T. 18, R. 69.

	Feet.
Reddish sandy loam.....	0- 13
Reddish conglomerate.....	13- 18
Light-blue clay.....	18- 210
Light limestone.....	210- 250
Light sand.....	250- 255
Alternating strata of shale and limestone.....	255- 780
Light limestone.....	780- 810
Light sand.....	810- 825
Alternating strata of shale and limestone.....	825-1, 025
Drab shale.....	1, 025-1, 195
Sand and limestone, locally called "Dakota cap rock".....	1, 195-1, 210
Light, almost white Dakota sandstone.....	1, 210-1, 230

Rig used, standard cable. Casing used, 1,048 feet of 5 $\frac{1}{8}$ -inch. Water-bearing strata penetrated at 230 to 235, 300 to 345, and 815 to 900 feet. Main supply from 1,210 to 1,230 feet. Static head of main supply, \pm 80 feet. Flow, 360 gallons per minute. Temperature at well mouth, 87° F. Quality, hard, alkaline.

193. Well 8 miles southeast of Swallows, Pueblo County.

[Authority, W. H. Spruance, jr. No samples. Geologic correlations by N. H. Darton.]

The rock formations penetrated by this well are of Cretaceous age. The Timpas limestone is between 9 and 45 feet, the top of the Carlile formation at 45 to 75 feet, the Benton shale at 75 to 500 feet; and the Dakota was struck at 535 feet.

Record of well in the SW. $\frac{1}{4}$ sec. 5, T. 21, R. 66.

	Feet.
Earth.....	0- 6
Light-gray shale.....	6- 9
Limestone with partings of shale 1 to 3 inches thick.....	9- 45
Sandstone.....	45- 75
Black and gray shale; water-bearing; surface flow of 8 to 10 gallons per minute at 265 feet.....	75-500
Soft shale and clay with a hard sandstone boulder.....	500-505
Shales streaked with clay.....	505-535
Sandstone; water-bearing.....	535-553
Shale.....	553-573
Fine sandstone; flow of water from sandstones below 535 feet was, at 580 feet, 10 gallons per minute.....	573-618
Shale and clay.....	618-665
Firm, hard limestone.....	665-672
Rather porous sandstone; flow at 680 feet 18 gallons per minute and at 700 feet 30 gallons per minute.....	672-715

	Feet.
Shale and clay.....	715-725
Sandstone.....	725-740
Shale and clay.....	740-743
Sandstone.....	743-753
Shale and clay.....	753-770
Sandstone.....	770-776
Shale and clay.....	776-778
Sandstone.....	778-781
Shale with traces of clay.....	781-796

Diameter of well, 10, 8, and 6 inches. Water at 265 feet salt; sulphur-bearing, with much carbonic-acid gas; unfit for either boiler or domestic use. Water from the sandstones below contained much carbonic-acid gas with 30.22 grains of incrustants to the gallon, while sodium carbonate and other nonincrusting solids made the water objectionable for boiler use. Flow of well, 19 to 30 gallons per minute; by pumping 150 gallons per minute water is lowered to -346 feet.

DELAWARE.

207. Well at Fort Dupont, Newcastle County.

Well begun December 17, 1904; completed April, 1905. Authority, Capt. L. F. Garrard, jr., constructing quartermaster. Geologic correlations by W. B. Clark.]

The sands, greensands, and clays penetrated by this well are of Pleistocene and Cretaceous age. As a jet rig was used, some samples may show a mixture of the particular beds penetrated with material washed from strata above. The section is remarkable chiefly for the thickness of the Potomac (early or fresh-water Cretaceous) formations. They are characterized by red and white clay and sand, as the overlying late or marine Cretaceous is characterized by beds of sand containing glauconite, known as greensands. The formations, in downward order, are Columbia (Pleistocene), Rancocas, Monmouth, and Matawan (late Cretaceous), Magothy, and Potomac group (early Cretaceous).

Record of United States well at Fort Dupont.

	Feet.
Columbia:	
Yellowish sand and fine gravel, brackish water.....	0- 24
Rancocas:	
Gray, slightly clayey sand and fine gravel.....	24- 40
Dark-greenish limy sand with shells; contains much glauconite.....	40- 60
Monmouth:	
Dark sandy micaceous clay.....	60-140
Medium gray sand with very little glauconite.....	140-150
Brownish-gray sandy clay with some glauconite.....	160-180
Matawan:	
Dark coarse sand and clay, some glauconite.....	180-197
Hard, light-red, slightly sandy clay.....	197-223
Dark micaceous sandy clay.....	223-240
Fine to medium drab or brownish-gray clayey sand with a little glauconite...	240-280
Fine to coarse brownish micaceous clay with some glauconite.....	280-300
Magothy, in part:	
Medium to coarse drab or brownish sand with varying amounts of glauconite and occasionally some clay.....	300-418
Fine to medium light-gray sand, no clay and very little glauconite.....	418-421
Potomac:	
Light brick-red clay with some sand.....	421-467
Fine to medium, slightly clayey, pinkish-buff or pinkish-brown sand.....	467-500
Fine to medium brownish-gray micaceous sand.....	500-510
Medium to fine pinkish-brown sand with red and white clay.....	510-640

Potomac—Continued.

	Feet.
Fine to medium light-brown micaceous sand and clay.....	640-650
Brownish-gray micaceous clayey sand containing lignite.....	650-661
Fine to medium pinkish-brown sand with beds of pink, red, and white clay and lignite.....	661-710
Medium varicolored sand with lignite.....	710-725
Coarse, light pinkish-brown sand.....	725-730
Light-brown sand, containing many brown granules; also lignite.....	730-734
Dark-brownish clay and coarse sand.....	734-736
Medium pinkish-brown clayey sand.....	736-740
Brown clay with coarse sand; contains lignite.....	740-745
Medium brownish clayey sand.....	745-750
Fine to coarse pinkish-brown sandy clay containing brown granules and lignite.....	750-755
Medium grayish-brown clayey sand.....	755-762

Rig used, jet. Diameter of casing, 8 inches. This well was lost by the slipping of a coupling on the casing. Another was drilled 10 feet away. Water-bearing stratum, 720 to 734 feet. Water rises nearly to surface, but flows over casing at and after high tide. Yield by pumping, 20 gallons per minute. Water is alkaline, yellowish brown in color, contains iron, has a slight odor of sulphur, and is distilled for drinking purposes. Mouth of well is 11 feet above mean low tide.

FLORIDA.

223. Well at Jacksonville, Duval County.

[Well begun August, 1903; completed October, 1903. Authority, R. N. Ellis, superintendent water-works. No samples preserved by Survey.]

The sand and gravel penetrated from 15 to 35 feet are probably of Pleistocene age. The formations lying below, it is believed, are late Tertiary, though the water-bearing limestone at the bottom may be equivalent to the Vicksburg (lower Oligocene). The beds, as shown by samples from neighboring wells, differ from those penetrated by deep borings at Savannah and other points on the south Atlantic coast in the large proportion of limestone. The beds from 750 to 860 feet, described as rock, are limestone or silicified phases of it; probably other "rock" beds are also. The "black gravel" mentioned in various beds from 50 feet down to 470 feet is most likely dark, fine and coarse, smoothly rounded nodules of uncertain origin.

Well at city waterworks, Jacksonville.

	Feet.
Filled ground and sand.....	0- 15
Varicolored gray to red sand.....	15- 34
Gravel.....	34- 34½
Yellowish fossiliferous rock.....	35- 40
Gravel with water.....	40- 44
Gray fossiliferous rock.....	44- 53
Clay with thin layers of white rock.....	53- 58
Blue clay with black gravel at 58-70 and 82-89 feet.....	58- 89
Rock.....	89- 94
Blue clay with black gravel.....	94-100
Rock, 2 inches thick.....	100
Blue clay with quartz sand and very fine black gravel.....	100-130
Very hard compact clay and sand.....	130-142
Greenish sandy clay.....	142-204
Greenish sandy clay with more or less black gravel and occasional streaks of pure clay.....	204-250
Sticky clay with sand and fine gravel.....	250-263

	Feet.
Rock.....	263 -263½
Greenish sandy clay with heavy gravel bed.....	263½-272
Blue clay containing very fine sand.....	272 -287
Sand rock.....	287 -289
Bed of shells, oysters, etc.; living types.....	289 -290
White clay.....	290 -294
Sand with clay enough to hold it.....	294 -298
Compact greenish sandy clay with streaks of nearly pure clay.....	298 -314
Sand containing shells with just enough clay to hold them.....	314 -320
Shells with scraps of fossil bone.....	320 -330
Coquina rock.....	330 -331
Clay.....	331 -340
Blue clay and sand.....	340 -350
Sticky blue clay; very little sand.....	350 -358½
Clay with black gravel.....	358 -365
Blue clay with gravel and shell casts.....	365 -368
White clay with gravel.....	368 -375
White marl with very little sand.....	375 -385
Light-colored clay.....	385 -390
Greenish clay.....	390 -400
Greenish sandy clay.....	400 -410
Sticky clay.....	410 -428
Clay with very little sand.....	428 -434
Nearly pure clay; very light when dry.....	434 -443
Bluish sandy clay with gravel and streaks of sticky clay with some nodules of rock.....	443 -470
Rock.....	470 -470½
Greenish clay with fine sand above and coarse sand below; small flow of water at 487 feet.....	470½-487
Rock boulder (siliceous concretion) in blue sandy clay.....	487 -492
Compact blue clay.....	492 -496
White clay.....	496 -497
Conglomerate rock.....	497 -499
Hard brownish rock.....	499 -504
Very hard compact rock (siliceous limestone).....	504 -510
Soft white rock with some water.....	510 -519
Hard compact rock.....	519 -524
Very soft white rock in layers 1 to 5 feet thick with strata of more compact rock 3 to 12 inches thick; increase in the flow of water on breaking each hard stratum. Gaged flow at 632 feet 1,000,000 gallons in twenty-four hours....	524 -727
Compact brownish rock; no water.....	727 -758
Alternate hard and soft strata of grayish rock with very little water.....	758 -865
Soft white rock with hard brown layers 1 to 3 feet thick every few feet; a slight increase of flow from each soft layer.....	865 -930
Very hard brown rock.....	930 -935
Soft brownish rock with hard layers, flow increasing as each hard layer is broken.....	935 -950
Alternate layers of hard and soft rock; small increase in flow.....	950 -970
More compact rock; no water.....	970 -980

Total flow 2,000,000 gallons in twenty-four hours. Temperature of water from 524 to 727 feet, 76° to 77.5°; from 865 to 970 feet, 78° to 79° at well bottom; temperature of flow at well mouth, 77½°. Static head +58 feet. This well is one of several supplying the city. Quality hard, sulphur bearing.

233. Well near Pensacola, Escambia County.

[Completed June, 1905. Authority, W. C. Le Gallais, driller. Samples preserved.]

The formations penetrated by this well range from the Pleistocene down into the Tertiary.

Record of well $1\frac{3}{4}$ miles southwest of Pensacola.

	Feet.	
Black soil.....	0-	1
Gray sand.....	1-	6
White sand.....	6-	29
Dark sandy clay.....	29-	72
White sand with bits of wood.....	72-	86
Gray sand.....	86-	106
Coarse white sand.....	106-	190
Coarse yellowish sand.....	190-	236
Fine gravel.....	236-	256
Coarse gravel.....	256-	276
Fine white sand.....	276-	290
Gray micaceous sand.....	290-	306
Brownish sand and white gravel.....	306-	326
Coarse gray sand with bits of shells.....	326-	342
Dark sandy clay.....	342-	390
Sand and gravel.....	390-	392
Dark sandy clay.....	392-	524
Coarse sand and gravel.....	524-	526
Dark sandy clay.....	526-	943
Coarse gray sand.....	943-	1,011

Elevation of well above sea level, 14 feet.

250. Well near Sumterville, Sumter County.

[Well completed in 1903. Authority, John W. Pearson, manager Pearson Oil and Gas Company, owner. Incomplete set of samples preserved. Log compiled from samples by S. Sanford.]

The rocks penetrated below 500 feet are nearly all limestones, varying somewhat in color and texture, but in general rather porous and granular and containing few determinable fossils. The well is noteworthy as being the deepest in the Florida peninsula; the only deeper well in the State was drilled at Key West.

Record of well $2\frac{1}{2}$ miles south of Sumterville.

	Feet.	
Soft brownish-gray limestone; hardens on exposure.....		165
Brown porous limestone.....	500-	525
Cream-colored porous limestone.....	525-	540
Brown porous limestone.....	540-	550
Light-brown porous limestone.....	560-	575
Light-buff porous limestone.....	575-	675
Light-buff to light-brown porous limestone, with much brown chert.....	700-	710
Light-buff porous limestone with little brown chert.....	740-	750
Brownish porous limestone.....	750-	785
Grayish-brown porous limestone with brown chert.....	785-	800
Light-buff porous limestone with little or no chert.....	800-	825
Porous brownish limestone with much brown chert.....	825-	850
Light-buff porous limestone with a little brown chert.....	850-	865
Grayish, light-buff, and brown porous limestone with considerable brown chert.....	865-	880
Light-buff or brownish limestone with much brown chert.....	880-	900

	Feet.
Hard brownish limestone with little brown chert.....	900- 925
Hard brownish limestone.....	925- 950
Brownish to light-brown porous limestone.....	950- 975
Light-buff porous limestone.....	1,000-1,005
Brown and brownish porous limestone with crystals of calcite.....	1,020-1,025
Brown sandy clay and black carbonaceous shale, approaching lignite.....	1,025-1,055
Light-buff lime rock.....	1,055-1,060
Brownish porous fossiliferous limestone.....	1,060-1,080
Light-brown porous fossiliferous limestone.....	1,100-1,110
Light-brown limestone with much brown chert.....	1,110-1,130
Cream-colored fossiliferous limestone.....	1,130-1,160
Soft white chalky fossiliferous limestone.....	1,160-1,230
Creamy-white oolitic limestone.....	1,230-1,260
White to brownish fossiliferous chalky limestone.....	1,260-1,325
Harder and more compact brown limestone with white fossiliferous streaks..	1,325-1,375
Brownish lime rock.....	1,375-1,400
Fine light-brown limestone containing much crystalline calcite.....	1,400-1,425
Brown granular limestone.....	1,425-1,450
White to brownish, rather granular limestone.....	1,450-1,475
Rather compact white to brownish fossiliferous limestone.....	1,475-1,500
Hard, compact grayish or brownish limestone; also soft white fossiliferous limestone.....	1,500-1,525
Coarse brown limestone with crystals of calcite.....	1,525-1,550
Brownish and grayish fossiliferous limestone.....	1,550-1,625
Hard brown to brownish limestone.....	1,625-1,650
Grayish and light-brown fossiliferous limestone.....	1,650-1,660
Compact crystalline brownish fossiliferous limestone.....	1,660-1,700
Light-buff crystalline limestone.....	1,700-1,750
Dark-brown clayey material, almost lignitic; contains streaks of brown limestone.....	1,750-1,800
Brown limestone with lignitic material and brown chert.....	1,800-1,850
Granular light-brown limestone.....	1,850-1,900
Brownish granular limestone with lignite and grains of quartz.....	1,900-1,950
Compact buff limestone.....	1,950-1,975

Rig used, standard. Diameter of well, 10 inches from top to bottom. Well was drilled for oil and shows were reported at several depths. A strong sulphur water was struck at 1,386-1,400 feet, but no salt water was found. Fresh water was struck from 18 feet downward at many horizons and gave much trouble in drilling. Water stands 2 feet below surface.

251. Well at Deland, Volusia County.

[Begun June 17, 1905; completed August 8, 1905. Authority, H. E. Smith, driller. Samples preserved.]

This well, starting in post-Tertiary sands and sandy clays, penetrates a succession of limy beds that are in part at least of Pliocene age.

Record of city well at Deland.

	Feet.
White quartz sand.....	0- 12
Yellow sandy clay.....	12- 22
Soft limestone with bits of shells.....	22- 36
Marl and sand with bits of shells.....	36- 54
Soft white limestone with bits of shells.....	54- 90
Hard gray and yellowish limestone.....	90-170
Hard dark to light brownish limestone.....	170-209

	Feet.
Hard white to brown limestone.....	209-230
Hard porous white and brown limestone.....	230-250
Soft porous limestone.....	250-264

Rig used, cable. Diameter of well, 10 inches. Water-bearing strata at 80 to 160 and 209 to 250 feet. Water from first bed rises within 29 feet of surface, and from second bed within 27 feet.

252. Well at Ormond, Volusia County.

[Well begun November 7, 1904; completed December 17, 1904. Authority, A. B. Kimball. Incomplete set of samples saved.]

The sands penetrated for the first 50 feet are post-Tertiary. The marls, shell beds, and limestones below are probably Tertiary. No attempt has been made to determine the divisions of the Tertiary or establish formation names.

Record of well at Hotel Ormond, Ormond.

	Feet.
Beach sand.....	0- 50
Fine sand containing small shells.....	50- 56
Clay.....	56- 64
Blue clay and shells (dark-gray marl containing shells of <i>Liocardium</i> , etc.).....	64- 90
Small roots.....	90- 92
Blue clay, shells, and sand.....	92-106
Gray coquina rock, shells of <i>Nassa</i>	106
Very hard rock (hard dark-gray shell rock, coquina, shells of <i>Lunatia</i>).....	106-110
Very soft rock (soft limestone, fossil shells).....	110-111
Soft gray and white limestone, containing fossil shells.....	111-150
Soft white marly limestone.....	150-200
Soft light-buff limestone with a layer of hard "rock" at 261-263 feet.....	200-352

Rig used, cable. Diameter of well, 10 inches. Length of casing, 106 feet. Water did not rise to surface. Well abandoned on account of salt water breaking in below casing.

GEORGIA.

254. Well near Savannah, Chatham County.

[Well begun May 2, 1905; completed in 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Samples preserved.]

The sand and clay near surface are probably of late Tertiary age (Pliocene), though the uppermost stratum of sand may correspond to the Columbia formation (Pleistocene). The marls and limestones below were all deposited in Tertiary time.

Record of well of Mutual Fertilizer Company, 3 miles west of Savannah post-office.

	Feet.
Soft dark-brown soil.....	0 - 1
Soft light-gray sand.....	1 - 3
Red and gray clay and fine sand.....	3 - 20
Loose dark-gray sand.....	20 - 30
Hard greenish-gray sandy limestone.....	30 - 31½
Tough dark-green sandy marl.....	31½-235
Porous white limestone, slightly sandy; water-bearing.....	235 -245
Soft gray porous limestone.....	245 -270
Coarser textured white, brownish, and gray limestone with coarse sand, bits of shells, and dark grains, the latter probably phosphatic; formation water bearing.....	270 -310
Light-buff limestone; considerable water.....	310 -330

Rig used, jet. Diameter of well, 8 inches; length of casing, 136 feet. Water rises within 4 feet of surface. Quality hard.

255. Well at Lela, Decatur County.

[Well begun September 11, 1905; completed December 1, 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

The white (kaolinic) and red and buff clays first penetrated may represent the weathered surface of the underlying limestones or may belong to the Columbia and Lafayette formations. The formations below are of Tertiary age. The limestone is probably part of the Vicksburg-Jackson group and may be Oligocene or Eocene. The underlying sands, with beds of rock, in part at least, represent the Claiborne and lower Eocene formations.

Record of well No. 3 at sawmill, Lela.

	Feet.
Soft white clay with red streaks; coarse white sand and fine gravel.....	1- 20
Soft gray and buff sandy clay; soft water in large supply.....	20- 40
Soft creamy-white sandy limestone.....	40-140
Soft brownish limy sandstone.....	140-160
Soft light-brown sandy limestone.....	160-180
Soft light-gray limestone, containing dark-green grains.....	180-200
Soft white to light-buff sandy limestone.....	200-220
Soft greenish marl.....	220-240
Hard white to grayish-brown sandy limestone.....	240-260
Soft white marl; may contain glauconite.....	260-320
Fine gray sand; contains glauconite and bits of shells; some water.....	320-380
Hard light-brown sandy limestone.....	380-400
Medium to fine light-gray sand; contains glauconite and bits of shells; has hard layers.....	400-460
Same sand with very little glauconite.....	460-520
Fine to medium gray sand containing layers of rock (probably white limestone) and very few grains of glauconite.....	520-580
Same sand and rock with more glauconite.....	580-720
Soft dark marl (no sample).....	700-918
Rig used, hydraulic. Diameter of well, 6 and 2 inches. Casing used, 600 feet of 3-inch.	
Main supply of water from 737 feet. Water rises within 10 feet of surface. Yield, about 15 gallons per minute.	

256. Well at Fort McPherson, Fulton County.

[Well begun December 13, 1904; completed April 24, 1905. Authority, Capt. B. Buck, constructing quartermaster. Samples preserved.]

This well is noteworthy, since it is sunk in the crystalline rocks of the Piedmont plateau, and the water obtained comes from joints, cracks, and like openings, no true water-bearing formations being penetrated.

Record of well at Fort McPherson.

	Feet.
Soil, clay and stones.....	0- 42
Hard light schistose crystalline rock.....	42
Very hard dark schistose crystalline rock.....	50- 55
Hard light schistose crystalline rock; little water at 75 feet, enough for drilling..	55-100
Hard dark schistose crystalline rock, with water-bearing crevices at 130 and 145 feet.....	130-145
Softer dark schistose crystalline rock, with water-bearing crevices at 165 feet; yield at 178 feet, 18.5 gallons per minute of clear, soft water.....	165-185
Hard dark schistose crystalline rock.....	205-225
Softer and lighter schistose crystalline rock.....	245-285
Hard dark schistose rock.....	305
Hard light schistose crystalline rock; small crevices in very hard rock at 365 feet.	325-365
Very hard light schistose crystalline rock; increase in water from 365 to 385 feet.	385-440
Rig used, standard. Depth of well, 452 feet. Diameter of well, 10 inches. Length of casing, 42 feet. Well pumps 45.6 gallons per minute. Water rises within 30 feet of surface.	

258. Well at Offerman, Pierce County.

[Well begun April 1, 1905; completed June 9, 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Incomplete set of samples preserved.]

All the formations below the thin surface soil at this well are probably of Tertiary age. They include beds laid down in Pliocene, Miocene, and Oligocene or Eocene time which have not been well enough identified to permit formation names to be given. The limestones below 500 feet are thought to belong to the Jackson-Vicksburg group.

Record of well of Southern Pine Company, on lot No. 269, Fourth district, Pierce County.

	Feet.
Black soil, chiefly made land.....	0- 1
Tough reddish and cream-colored sandy clay.....	1- 40
Tough pink clayey sand.....	40- 60
Loose, coarse white gravel; water-bearing; yields one-half gallon per minute for each foot head is depressed.....	60- 70
Tough, sticky cream-colored sandy clay.....	70-120
Loose fine grayish sand; no water.....	120-130
Tough, sticky cream-colored marl, like pipe clay.....	180-240
Soft cream-colored sandy marl, with hard layers.....	240-260
Dark-blue sandy marl, with hard layers.....	260-280
Loose, coarse white sand.....	280-300
Soft blue-black and black sandy marl with hard layers.....	300-400
Loose, fine brownish limy sand with hard layers.....	400-420
Tough white limestone with hard layers.....	420-440
Loose, fine white sand with hard layers.....	440-460
White limestone; water-bearing.....	460-480
Loose, fine gray sand; water-bearing.....	480-490
Hard brown limestone and soft marl.....	490-500
Loose white sand, containing glauconite; no water.....	500-518
Coarse gray sand, with bits of soft limestone and shells; also black granules....	532
Cream-colored limestone with very siliceous gray limestone, chert nodules, and grains of quartz.....	540-550
Flinty gray limestone and yellow shell rock with chert nodules and quartz grains; two days' drilling.....	550-555
Hard white sand (sample much like preceding); no water.....	555-560
Medium soft cream-colored limestone (sample much like preceding).....	560-570
Very hard flinty limestone (sample shows little chert at 573-575 feet).....	570-600
Very soft cream-colored limestone, with plenty of water at 640 feet to bottom..	600-675½

Rig used, jet. Diameter of casing, 6 and 4½ inches; length, 635 feet. Water obtained from 640 to 675½ feet; rises within 33 feet of surface; is depressed about 25 feet by pumping 250 gallons per minute. Water slightly sulphuretted. Temperature at well mouth, 76° F.

260. Well at Claxton, Tattnall County.

[Well begun July 6, 1905; completed August 25, 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Incomplete set of samples preserved.]

The red pebbly sand and stiff red clay near surface probably belong to the Lafayette formation. The marl and limestone below are of Tertiary age, but no attempt is made to correlate them with formations which outcrop farther inland. The water-bearing limestone at the bottom is part of the Jackson-Vicksburg group of early Oligocene or late Eocene age.

Record of well at Claxton.

	Feet.
Orange and red pebbly sand with ferruginous nodules	0- 3
Stiff red clay	3- 10
Fine white sand; water bearing, with a little white clay	10- 60
Soft "shell formation"	60- 70
Brownish-gray sandy marl	70-120
Stiff blue marl	120-145
Tough gray rock	145-155
Gray sandy marl (probably gray sandy clay)	155-175
Very hard gray rock	175-180
Soft blue marl	180-220
Very hard rock	220-225
Tough marl	225-250
Very hard rock	250-270
Brownish-gray sandy marl	270-310
Hard white rock	310-350
Fine white sand	350-365
Hard brownish limestone	365-370
Hard brownish-gray marl	370-380
Hard gray rock	380-400
Marl and rock	400-452
Hard rock	452-460
Soft "shell formation;" water-bearing	460-505
Hard brownish limestone and dark-gray shale	505-510
Brownish limestone with soft layers; water-bearing	510-546½

Rig used, jet. Diameter of well, 8 inches. Length of casing, 452 feet. Water stands 80 feet below surface. Well yields 3 gallons per minute for each foot head is depressed. Present yield 100 gallons per minute. Temperature, 75° F.

ILLINOIS.

266. Well near Mount Sterling, Brown County.

[Well begun September 1, 1905; completed September 20, 1905. Authority, Joseph Simmons, jr., contractor. Samples preserved.]

The rocks penetrated by this well belong chiefly, if not wholly, to the Pennsylvanian or Coal Measures series of the Carboniferous. The limestones and limy shale below 200 feet may belong to the Mississippian series.

Record of well in sec. 1, 3 miles west of Mount Sterling.

	Feet.
Soft gray, slightly limy shale	30- 55
Soft reddish and light-brown limy shale	55- 75
Soft dark-gray, slightly limy shale	75-120
Soft dark-gray and greenish shale	120-135
Soft black and gray limy shale	135-165
Soft brownish, slightly limy shale	165-170
Soft red and dark-gray limy shale	170-180
Hard white shaly limestone	180-195
Soft cream-colored limy shale	195-200
Soft gray limestone	200-225
Soft greenish limy shale	225-235

Rig used, cable. Diameter of well, 5½ inches. Main supply of water from below 225 feet. Water rises within 80 feet of surface. Well yields by pumping 2 gallons per minute.

280. Well at Doltons, Cook County.

[Well begun in 1905; completed October 3, 1905. Authority, H. W. Hambrecht, superintendent L. Wilson Well Company, contractor. Samples preserved. Geologic correlations checked by G. H. Ashley.]

As the record of this well was apparently kept with much care and the samples and the driller's log check nicely, the record probably has greater value than any from Cook County yet published. The formations below the drift are, in downward order, Niagara limestone (Silurian); Cincinnati shale, Galena and Trenton limestone, St. Peter sandstone, and "Lower Magnesian" limestone (Ordovician).

A description of the geology of the Chicago quadrangle is given in folio 81, Geologic Atlas of the United States.

Record of well at Doltons.

Recent and Pleistocene:

	Feet.	
Black soil.....	0-	1
Light-yellow quicksand.....	1-	7
Gray limy brick clay.....	7-	40
Hard gray clay, hardpan, with limestone pebbles.....	40-	57

Niagara:

Loose gray limestone; water-bearing; water bad quality.....	57-	60
Medium hard to hard light-gray to gray limestone, heavy bedded.....	60-	340
Medium hard light-gray and light-brown limestone.....	340-	440
Soft brownish-gray limestone.....	440-	446

Cincinnati:

Soft bluish-gray clayey limestone or calcareous shale.....	446-	460
Soft gray limy shale with limestone lentils.....	460-	500
Soft dark-gray limy shale.....	500-	602
Soft gray and brown limy shale.....	602-	620

Galena and Trenton:

Soft brownish and gray limestone with streaks of shale.....	620-	640
Hard brownish and gray limestone with streaks of shale.....	640-	645
Soft light-brown and white limestone.....	645-	700
Soft and hard light-brown limestone with streaks of gray shale.....	700-	795
Hard white to brownish limestone.....	795-	805
Hard brown limestone with streaks of brownish shale.....	805-	840
Hard light-gray and light-brown limestone with streaks of gray shale.....	840-	850
Hard to medium gray and brownish limestone.....	850-	895
Hard white, dark-brown, and light-brown limestone.....	895-	910

St. Peter:

Hard light-brown sandy limestone and gray shale.....	910-	920
Medium to hard white, gray, and brownish sandstone; no water in upper portion of sandstone; some water in lower layers.....	920-	1,036

"Lower Magnesian:"

Soft greenish shale with brownish limestone.....	1,036-	1,041
Greenish and brown shale and gray limestone.....	1,041-	1,110
Hard white and brownish, magnesian limestone.....	1,110-	1,140
Soft light-buff magnesian limestone.....	1,140-	1,170
Hard brownish sandy magnesian limestone.....	1,170-	1,240
Soft grayish and brownish magnesian limestone and gray shale.....	1,240-	1,260
Hard white and brownish magnesian limestone.....	1,300-	1,312

Limestone below 1,040 feet full of small crevices. Between 1,200 and 1,300 feet crevices of 2 to 18 inches.

Rig used, cable. Well diameter, 12 inches, 0 to 65 feet; 10 inches, 65 to 203 feet; 8 inches, 203 to 1,073 feet; $6\frac{3}{8}$ inches to bottom. Yield by pumping 186 gallons per minute.

282. Well at Galewood, Cook County.

[Well completed in 1905. Authority, Chicago, Milwaukee and St. Paul Railway, owner. No samples. Geologic correlations checked by G. H. Ashley.]

This record is of interest in connection with that of well No. 280, from its greater depth. It agrees with others from near Chicago. The formations, in downward order, are Niagara limestone (Silurian); Cincinnati shale, Galena and Trenton limestones; St. Peter sandstone, and "Lower Magnesian" limestone (Ordovician); Madison sandstone, Mendota limestone, and Potsdam sandstone (Cambrian).

Record of well at Galewood.

	Feet.
Drift.....	0- 94
Niagara:	
Limestone.....	94- 265
Cincinnati:	
Shale.....	265- 505
Galena and Trenton:	
Limestone.....	505- 845
St. Peter, in part:	
Sandstone.....	845- 925
"Lower Magnesian:"	
Limestone; caves from 1,160 to 1,264 feet, containing crevices; also streaks of shale.....	925-1,325
Madison (?):	
Sandstone.....	1,325-1,525
Mendota (?):	
Hard limestone.....	1,525-1,540
Streaky shale.....	1,540-1,620
Shale.....	1,620-1,645
Limestone.....	1,645-1,785
Potsdam:	
Sandstone.....	1,785-1,804
Limestone.....	1,804-1,812
Shale.....	1,812-1,815
Sandstone.....	1,815-1,819

Diameter of well, 10½, 8, 6, and 5 inches. Water stands 84 feet below surface.

284. Well in T. 7, R. 12, Crawford County.

[Authority, John F. Lafferty. No samples.]

This record shows the general character of the formations penetrated by the gas and oil wells in the southern part of the Illinois field. The formations are part of the Carboniferous system and much the greater portion of them are included in the Pennsylvanian or Coal Measures series. The sandstones at 1,134-1,196 feet may be the basal sandstones of the series, corresponding to the Mansfield sandstone of the Indiana geologists.

Record of well in sec. 28, T. 7, R. 12.

	Feet.
Clay and shale.....	0- 110
Sandstone.....	110- 140
Black shale.....	140- 160
Dark slate.....	160- 175
Light and dark shale.....	175- 220
Light sandstone.....	220- 228
Light "sticky" shale.....	228- 245

	Feet.	
Dark and light shale.....	245-	275
Sandstone.....	275-	315
Brown and light shale.....	315-	395
Dark slate.....	395-	402
Dark limestone.....	402-	408
Light shale.....	408-	430
Hard limestone.....	430-	437
Dark-brown shale; caves.....	437-	447
Light and dark shale.....	447-	532
Coal.....	532-	536
Clay.....	536-	544
Limestone.....	544-	549
Shale.....	549-	557
Sandstone.....	557-	575
Coal.....	575-	577
Rock.....	577-	582
Slate.....	582-	592
Shale.....	592-	600
Sandstone.....	600-	627
Shale.....	627-	635
Hard rock.....	635-	639
Coal.....	639-	641
Fire clay and shale.....	641-	666
Sandstone.....	666-	676
Shale.....	676-	720
Sandstone.....	720-	750
Brown and black shale; 9-foot seam of coal at about 820 feet.....	750-	840
Sandstone; a little salt water.....	840-	880
Shale; 6-inch seam of coal at about 900 feet.....	880-	970
Sandstone; some gas.....	970-	980
Shale.....	980-	1,010
Sandstone.....	1,010-	1,045
Shale.....	1,045-	1,055
Sandstone; heavy flow of salt water at 1,100 feet.....	1,055-	1,127
Dark shale; 6-inch seam of coal at about 1,130 feet.....	1,127-	1,134
Sandstone; heavy flow of salt water at 1,170 feet.....	1,134-	1,174
Brown sandstone.....	1,174-	1,184
Dark sandstone; gas.....	1,184-	1,196
Dark limestone.....	1,196-	1,206
Dark sandstone.....	1,206-	1,218
Dark slaty shale, finely jointed; caves badly.....	1,218-	1,238
Slaty shale; limestone at bottom.....	1,238-	1,345

Salt water at 1,100 and 1,170 feet rises within 60 feet of surface. Hole dry below 1,196 feet.

285. Well at Flat Rock, Crawford County.

[Well begun January 1, 1905; completed June 20, 1905. Authority, Creswell Bros., contractors. No samples.]

This well was sunk for oil; none was found in paying quantity. The well started in the Pennsylvanian (Coal Measures) series of the Carboniferous system and probably penetrated the underlying sandstones and shales of the Mississippian. The record may not show every change in the rocks, but is given because few deep-well records from Crawford County have been published.

Record of well in the SW. $\frac{1}{4}$, sec 6, T 7, R. 11.

	Feet.
Soil and subsoil.....	0- 28
Yellow sand; fresh water.....	28- 30
"Soapstone" and conglomerate.....	30- 50
Sandstone; fresh water in very large quantity.....	50- 60
Shales with small breaks of limestone.....	60- 450
Coal.....	450- 455
Shale and slate, light and dark, in alternating strata.....	455- 500
Sandstone.....	500- 510
Coal.....	510- 517
Slate and shale.....	517- 650
Soft sand; salt water.....	650- 780
Shale.....	780- 850
Salt sand; water.....	850-1,000
Shale.....	1,000-1,060
Sandstone; white sulphur water.....	1,060-1,110
Dark shale.....	1,110-1,200
Sandstone; about 2 feet of limestone at 1,400 feet; small show of oil.....	1,200-1,530
Red shale.....	1,530-1,535
Dark shale.....	1,535-1,540

Rig used, cable. Casing used, 32 feet of 10-inch; 800 feet of 6 $\frac{1}{4}$ -inch; 1,100 feet of 4 $\frac{1}{2}$ -inch. Water-bearing strata from surface to 28 feet, at 60 feet, and from 650 to 1,110 feet. Well flows 20 gallons per minute of salt water.

301. Well near Warsaw, Hancock County.

[Well begun in October, 1904; completed in March, 1905. Authority, D. W. Haggerty, contractor. No samples. Geologic correlations checked by G. H. Ashley.]

This well penetrates limestones and cherts of Mississippian age which underlie the recent soil and glacial (Pleistocene) clays. They are Keokuk formation, Montrose chert, and Burlington limestone.

Record of well in the SW. $\frac{1}{4}$, sec. 13, T. 4, R. 9.

	Feet.
Recent and Pleistocene:	
Black soil.....	1- 3
Yellow clay.....	3- 50
Blue clay.....	50- 98
Keokuk:	
Blue limestone.....	98-140
Blue shale.....	140-155
White limestone.....	155-200
Montrose chert:	
Flint and rock.....	200-235
Burlington:(?)	
Blue shale.....	235-240
Black limestone.....	240-304
Magnesian limestone.....	304-320
Flint and limestone.....	320-325
Magnesian limestone.....	325-330
Blue lime.....	330-334
Sandstone.....	334-337
White limestone.....	337-340

Rig used, cable. Diameter of well, 6 inches. Length of casing, 112 feet. Water from 325 to 340 feet. Well yields 10 gallons per minute by pumping.

316. Well at Peru, La Salle County.

[Well begun and completed in 1905. Authority, J. D. Kemp, driller. Samples preserved to 550 feet. Log compiled from samples by S. Sanford.]

Several deep wells have been sunk near Peru, but the overlap of Carboniferous on much older rocks makes correlation of the well records difficult. The water-bearing stratum is apparently the base of the Trenton limestone (Ordovician).

Record of city well at Peru.

	Feet.
Soft brown shale, with limy streaks.....	20- 40
Soft red and gray shale with fragments of white limestone.....	40- 50
Soft gray, slightly limy and micaceous shale.....	50- 70
Soft dark, slightly limy shale.....	70- 85
Soft black shale.....	85- 95
Soft gray limy shale.....	95-110
Soft gray limy and micaceous shale.....	110-135
Soft black shale, slightly limy.....	140-158
Gray sandy limestone.....	158-170
Brownish sandy and slightly limy shale.....	170-220
Soft dark gritty shale with brownish limestone at base.....	220-255
Brownish-gray limestone.....	255-285
Dark gritty shale.....	285-305
Soft dark limy shale.....	305-350
Brownish-gray impure limestone.....	350-375
Brownish-gray limy shale.....	375-400
Brownish-gray impure limestone.....	400-420
Soft brownish-gray limestone to 480 feet, harder below.....	460-520
White to brownish-gray granular cherty limestone.....	520-550

Rig used, pole tools. Depth of well, 1,255 feet. Casing used, 14-inch, 52 to 355 feet; 12-inch, 355 to 450 feet; 10-inch, 450 to 900 feet; 8-inch, 900 to 1,255 feet. Salt water at 700 to 750 feet. Principal water bed at 1,100 feet. Well flows 200 gallons per minute and yields about 600 gallons by air lift. Static head, +85 feet. Temperature, 67° F.

"Coal No. 2 at Peru is mined at 314 feet, so that the bottom of the Coal Measures may come at 350 feet. The limestone below is probably Trenton. Where the Coal Measures outcrop but a short distance away, no such thickness of limestone is found as reported by this well from 220 to 285 feet."—G. H. Ashley.

330. Well near Baylis, Pike County.

[Well begun November 3, 1905; completed November 14, 1905. Authority, A. J. Clark, contractor and driller. Samples preserved.]

This is one of a group of three shallow wells drilled for gas. The rocks penetrated are all of Carboniferous age and are part of the Mississippian series, which, by the Illinois State Survey, was divided into St. Louis group, Keokuk group, Burlington limestone, and Kinderhook group. The gas found by this well is thought to occur in the Burlington limestone.

Record of well in the SE. $\frac{1}{4}$ sec. 1, $5\frac{1}{2}$ miles south of Baylis.

	Feet.
Soil and clay.....	0- 14
Light shale (soft dark-grayish shale).....	14-115
Dark shale (soft dark-brown, finely micaceous shale); strong odor.....	115-174
Light shale like No. 2 (no sample).....	174-182
Limestone (white, more or less crystalline cherty limestone).....	182-194
Sandstone (light-brownish, finely gritty limestone) containing gas, pressure 7 to 8 pounds.....	194-214
Limestone (white and light-brown, not crystalline).....	214-215
Light shale like No. 2 (no sample).....	215-286
Drab sandstone (finely gritty limestone).....	286-312

Rig used, cable tools. Diameter of casing, $7\frac{1}{4}$ and $5\frac{1}{8}$ inches.

343. Well near Rushville, Schuyler County.

[Well begun and completed in September, 1905. Authority, J. B. Dunant, driller. Incomplete set of samples preserved.]

This well went through rocks of Pennsylvanian or Coal Measures age from 16 to 170 feet, and then struck Mississippian (?) limestone.

Record of well in sec. 5, T. 2, R. 3, 7 miles northwest of Rushville.

	Feet.
Hard yellow clay.....	1- 16
Soft brown sandstone.....	16- 70
Hard blue slate.....	70- 80
Coal.....	80- 83
Hard brown shale.....	83-170
Gray cherty limestone.....	170-270
White limestone.....	270-372

Rig used, cable. Diameter of well, $7\frac{1}{8}$ and $5\frac{1}{2}$ inches. Casing used, 90 feet of $5\frac{1}{2}$ -inch. Water stands 47 feet below surface.

INDIANA.**370. Well near Selma, Delaware County.**

[Well begun January 18, 1905; completed February 2, 1905. Authority, Shirkcliff & Anderson, contractors. Samples preserved. Geologic correlations checked by G. H. Ashley.]

This log gives a section of the rocks overlying the Trenton limestone in the Smithfield district in Wayne County. The formations below the drift (Pleistocene) are Niagara limestone and shale (Silurian), Cincinnati and Utica shale, and Trenton limestone (Ordovician).

Record of well in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 22, T. 20, R. 11 (well No. 25 on H. K. Lewis's farm).

	Feet.
Drift:	
Light-brown clay.....	0- 20
Drab quicksand, clay and gravel.....	20- 80
Hard gray gravel and sand.....	80- 140
Niagara:	
Hard dark-brownish limestone.....	140- 180
Drab limestone; water-bearing.....	180- 200
Soft gray limestone and shale.....	200- 340
Cincinnati:	
Soft black shale.....	340- 540
Utica:	
Soft brownish-gray shale.....	540- 932
Trenton:	
Hard rock.....	932-1, 219

Rig used, cable. Diameter of well, 8 inches from 0 to 343 feet; 6 inches from 343 to 1,219 feet. Length of casing, 343 feet.

387. Well near Loogootee, Martin County.

[Well begun June 28, 1905; completed July 15, 1905. Authority, C. O. Potter, driller. Samples preserved. Geologic correlations by G. H. Ashley.]

This record gives a section at one of the few gas and oil pools in Indiana that occur in other rocks than those of the Trenton group. The pay sand in this, the Loogootee pool, has been referred to the Devonian and called the equivalent of the Onondaga (Carboniferous) of New York. This, however, is clearly impossible, since, according to a section across southern Indiana, given in the twenty-sixth annual report of the State survey, the stratigraphic equivalent of the Onondaga must lie over 1,200 feet below the surface at Loogootee. Almost as wrong is its correlation as "Huron, Kaskaskia in part," since the Kaskaskia was probably passed through within the first 200 feet. The pay sand is referred to the top of the Knobstone formation of the Mississippian series of the Carboniferous system.

Record of well in center of SE. $\frac{1}{4}$ sec. 2, Barr Township.

	Feet.
Soft yellow and white clay.....	2- 10
Soft light marl with a little water.....	10- 22
Soft greenish-gray limy shale with yellow quicksand.....	22- 42
Soft light shale, not enough water for drilling.....	42- 50
Hard gray sandy shale; at 75 feet water stands within 20 feet of surface.....	50- 90
Soft dark-gray limy shale; show of coal at 90-95 feet; shale is hard to mix.....	90-120
Soft dark shale.....	120-180
Very soft black shale, almost coal.....	180-187
Soft light-gray sandy shale; show of oil at 210 feet.....	187-240
Soft white sand with streaks of gray limestone and shale; sandstone fine at top, coarse at bottom.....	240-265
Coarse white sandstone with streaks of limestone and shale.....	265-280
Soft gray limy sandstone; water fell 20 feet in hole at 330 feet.....	280-335
Very hard brownish limestone with about 4 feet of shale near the center.....	335-355
Very hard gray sandstone and limestone; show of oil.....	355-405
Very hard brownish and grayish limestone.....	405-415
Thin layers of very hard bluish-gray sandstone and brown limestone with occa- sional streaks of soft green shale; show of oil.....	415-465
Hard gray sandstone with limy streaks.....	465-475
Very hard white to brownish limestone with dark-gray shale.....	475-480
Hard greenish gray limy shale, called "rubber rock;" hard to mix.....	480-498
Hard brown limestone.....	498-509
Soft gray shale.....	509-518
Light-gray sandstone and dark-gray shale; Loogootee gas sand.....	518-542

Rig used, cable. Casing used, 8-inch from top to 498 feet; 5 $\frac{1}{2}$ -inch from 498 to 542 feet.
Initial pressure of gas, 55 pounds per square inch; volume, about 75,000 cubic feet per day.

401. Well near Parker, Randolph County.

[Well begun December 16, 1904; completed January 16, 1905. Authority, S. C. Clover, of Iona Drilling Company, contractor. Samples preserved. Geologic correlations by G. H. Ashley.]

This is the log of a well near the eastern edge of an oil pool that extends westward nearly to Muncie. The formations penetrated are, in downward order, clay, sand, and gravel of the drift (Pleistocene); Niagara limestone (Silurian); Cincinnati and Utica shale and Trenton limestone (Ordovician). As the well went into "Trenton rock" for 500 feet it is possible that the limestone last penetrated is older than Trenton age.

Record of well No. 4 on Van Pelt farm, 3 miles northeast of Parker.

	Feet.
Drift:	
Soft yellow clay.....	0- 20
Hard dark gravel and clay.....	20- 140
Niagara:	
Hard white limestone; water-bearing.....	140- 165
"First break;" soft, white.....	165- 225
"Second break;" soft, white, dry.....	225- 280
Cincinnati:	
Soft white slate, dry.....	280- 380
Hard white (gray) shells; shale gas at 380-420 feet.....	380- 440
Soft white (gray) slate.....	440- 725
Utica:	
Soft brown (gray) shale.....	725- 945

Trenton:

	Feet.
Hard light Trenton rock; gas at 960 feet, dry below.....	945-1, 240
Hard darker Trenton rock; pay sand.....	1, 240-1, 260

Rig used, cable. Diameter of well, 8 inches from 0 to 345 feet and 5½ inches from 345 to 1,260 feet. Length of casing, 345 feet. Main inflow of water struck at 100 to 300 feet.

This well was drilled almost dry; after shooting it made a fair producer, settling down to 12 or 15 barrels daily. Very little gas was found, enough for a 25-horsepower gas engine.

402. Well near Howell, Vanderburg County.

[Well begun May 24, 1905; completed June 6, 1905. Authority, William H. Miller, contractor and driller. Samples preserved. Geologic correlations by G. H. Ashley.]

This well penetrates rocks that form part of the Coal Measures or Pennsylvanian series of the Carboniferous system. As porous beds are seldom of great extent in the Coal Measures, deep wells in those rocks often fail to obtain large supplies of water. The rocks penetrated by this well have been described in the Ditney folio (No. 84) and the Patoka folio (No. 105) of the Geologic Atlas of the United States. They are included in the Inglefield, Ditney, Somerville, Millersburg, Petersburg, and Brazil formations.

Record of well at West Height Park, Evansville, Ind.

Drift:

	Feet.
Yellow clay.....	0 - 8
Yellow sand.....	8 - 28

Inglefield:

Soft yellow sandstone.....	28 - 35
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Ditney:

Gray limy shale.....	35 - 62
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Somerville:

Hard light-gray limestone.....	62 - 65
Soft gray limy shale.....	65 - 67
Soft limestone (no sample).....	67 - 79

Millersburg and Petersburg:

Brownish and dark-gray shale.....	79 -245
Coal (Petersburg).....	245 -247

Brazil:

Gray shale.....	247 -278
Hard light-gray sandstone.....	278 -286
Gray limy shale.....	286 -288
Soft light-gray limy sandstone.....	288 -294
Soft, coarse white sandy limestone.....	294 -298
Coal.....	298 -299½
Dark-gray shale.....	299½ -303
Dark sandy limestone.....	303 -306
Dark gray limy shale.....	306 -309
Hard yellowish to bluish limestone (no sample).....	309 -310

Rig used, cable. Diameter of well, 5½ inches. Length of casing, 33 feet. Water in small quantity found between 288 and 298 feet.^c Well pumped but 1 gallon per minute.

INDIAN TERRITORY.

407. Well near Alluwe, Cherokee Nation.

[Well begun and completed in 1905. Authority, Marcus Simpson, of Carey Oil and Gas Company, owner. Samples preserved.]

This record shows the formations struck by the wells near Alluwe, in the Alluwe-Nowata-Coodys Bluff oil pool. The formations belong to the Pennsylvanian series of the Carboniferous system. They consist largely of shales, sandy shales, and sandstones, and have not been definitely correlated with formations studied in the Kansas oil field. The Alluwe-Coodys Bluff pool is noted for the wells being comparatively shallow..

Record of well in the SE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 18, T. 25, R. 17.

	Feet.
Soft yellow clay.....	2- 22
Brownish-gray shale.....	22- 37
Brownish-gray limestone.....	37- 83
Slate (hard black gritty shale).....	83- 87
Brownish-gray shale.....	87- 96
Soft light-gray shale.....	96-112
Brownish-gray limestone.....	112-121
Black slate (gritty shale).....	121-126
Oil sand (gray limy sandstone).....	126-130
Blue shale (light sandy shale).....	130-146
Soft white (light-gray) limy shale.....	146-310
Soft light-gray shale.....	310-423
Oil sand (gray limy sandstone and black shale).....	423-433
Soft gray shale.....	433-462
Oil sand (light-gray, slightly limy sandstone and black shale)—pay at 475-510 feet.....	462-510
Soft gray shale; pocket.....	510-519½

Rig used, cable. Casing used, from 0 to 37 feet, 8½-inch; from 37 to 146 feet, 6½-inch. Initial yield of oil, 75 barrels in twenty-four hours. Quality, 36° B.

408. Well near Bartlesville, Cherokee Nation.

[Well begun June 14, 1905; completed June 30, 1905. Authority, A. E. Reed, of Curl & Scott, owners. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by E. O. Ulrich.]

This well is in the Bartlesville oil pool. The formations penetrated belong to the Pennsylvanian series of the Carboniferous system. The oil is found in sandstone lentils in the bottom member of this series, the Cherokee shale. The formations have not been correlated, except tentatively, with those that have been studied in the Kansas oil and gas fields.

Record of well No. 2 on Norton lease, in the NW. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 1, T. 26, R. 12.

	Feet.
Gray limy shale and sandstone.....	50- 110
Drum (?):	
Gray impure limestone.....	110- 220
Gray limy sandstone.....	220- 260
Soft gray and dark-gray to black, slightly limy shale with hard gritty layers.....	260- 500
Soft brownish-gray to brownish-black limy shale and impure limestone..	500- 540
Rather coarse, hard brownish and grayish limestone.....	540- 580
Gray shale with sandy and limy layers.....	580- 620
Brownish limestone.....	620- 700

Drum (?)—Continued.

	Feet.
Soft black limy shale.....	700- 720
Brownish limestone and dark limy shale	720- 740
Gray sandy and limy shale.....	740- 760
Coarse brownish granular limestone.....	760- 780
No sample.....	780- 800
Chocolate-colored shale, slightly limy.....	800- 840
Gray, slightly sandy and limy shale.....	840- 860

Fort Scott:

Hard brownish limestone, fossiliferous to 890 feet, and dark-gray to black shale	860- 925
Brownish gritty granular limestone and dark-gray shale	925- 950

Cherokee:

Dark-gray to black sandy shale.....	950-1, 000
Gray limy sandstone and dark shale.....	1, 000-1, 025
Dark-gray, brownish, and black sandy and slightly limy shale.....	1, 025-1, 160
Gray and brownish-gray sandy shale.....	1, 160-1, 220
Dark-gray, slimy shale	1, 225-1, 250
Brown limy shale; smells of oil.....	1, 270-1, 280
Brown sandy shale.....	1, 280-1, 290
Light-brown, limy sandstone, with streaks of dark-gray shale below 1,300 feet	1, 290-i, 319½

Rig used, cable. Casing used, 10-inch to 40 feet; 8¼-inch to 1,005 feet; 6½-inch to 1,319½ feet. Initial yield of oil, 40 barrels in twenty-four hours. Quality, above 32° B.

416. Well near Turley, Cherokee Nation.

[Well begun December 1, 1905; completed December 18, 1905. Authority, T. B. Mack, driller. Incomplete set of samples preserved. Geologic correlations by E. O. Ulrich.]

This well is in the Hominy Creek pool, which includes the wells in the strip of oil-producing territory near Tulsa. The oil is found in sandstones belonging to the Pennsylvanian series of the Carboniferous system. The formations penetrated by this well have not been given formation names, except the two limestones which outcrop to the east, the Oologah and the Fort Scott. Between the latter and the Mississippian are possibly over 5,000 feet of shales and sandy beds, compared with 450 feet in Kansas.

Record of well in the NW. ¼ sec. 13, T. 21, R. 12, 3¼ miles north of Turley.

	Feet.
Surface mud (light brownish-red sand and clay).....	20- 40
Slate (gray and greenish, gritty, slightly limy shale).....	40- 150
Sand (brown granular limestone).....	150- 200
{ Limestone (same limestone and gray gritty shale).....	200- 300
Oologah (?) { Big Lime (dark limestone and black limy shale).....	300- 350
{ Big Lime (black impure shaly limestone).....	350- 400
Slate (gray and greenish gritty shale with slightly limy layers).....	400- 450
Slate (dark-gray argillaceous sandstone).....	450- 475
Slate (dark brownish-gray gritty shale, slightly limy).....	475- 500
Slate (dark-gray and greenish gritty shale, slightly limy).....	500- 550
Slate (dark-gray limestone).....	550- 600
Fort Scott: Oswego limestone (gray to dark-gray shaly limestone).....	600- 650
Shale.....	650- 750
Black shale.....	750- 900
Shale.....	900-1, 130

Top of oil sand (compact black sandy shale and medium to fine brown sandstone, slightly limy).....	Feet. 1, 130-1, 135
Oil sand (same sandstone, with smaller proportion of black shale).....	1, 135-1, 173
Rig used, cable. Length of casing, 1,100 feet. Water-bearing strata from 30 to 40, 300 to 450, and 700 to 750 feet. Initial yield of oil, 20 barrels in twenty-four hours.	

422. Well at Davis, Chickasaw Nation.

[Well begun May 24, 1905; completed August 2, 1905. Authority, Jolly & Hahn, contractors. No samples.]

The formations penetrated belong to the "red beds," which are generally referred to the Permian series of the Carboniferous system. The record shows the alternations of red mud (soft shale), red and blue slate (gritty shale), limestone, and sandstone that are characteristic of the "red beds."

The geology of the Arbuckle Mountains and the adjacent "red beds" is discussed in Professional Paper No. 31, "Geology of the Arbuckle and Wichita mountains," by J. A. Taff.

Record of well at Davis.

	Feet.
Red mud; cavey place to drill.....	0- 25
Gravel.....	25- 30
Red mud and sand.....	25- 55
Gravel.....	55- 60
Red mud.....	60- 90
Limestone.....	90-105
Red and light-red mud.....	105-225
White and gray limestone.....	225-250
Red slate.....	250-255
Limestone.....	255-260
Red slate.....	260-265
Blue slate.....	265-300
Blue limestone.....	300-305
Blue slate.....	305-330
Red slate.....	330-370
Red limestone.....	370-395
Red mud.....	395-430
Hard limestone.....	430-440
Gray sand.....	440-455
Red mud.....	455-475
Red sandstone.....	475-485
Red clay.....	485-500
Sandstone and red sandstone.....	500-525
Red slate.....	525-535
Blue slate.....	535-540
Sand.....	540-555
Red slate.....	555-580
Sandstone.....	580-600
Blue slate.....	600-610
White slate.....	610-620
Red slate.....	620-640
Blue slate.....	640-650
Red slate.....	650-680
Sandstone.....	680-700
Blue slate.....	700-705
White slate.....	705-710

	Feet.
Red slate.....	710-730
Blue slate.....	730-740
White slate.....	740-760
White limestone.....	760-780
Yellow slate.....	780-785
Red mud.....	785-790
Brown slate.....	790-800
Slate, red slate at 875-900 feet.....	800-906
- Rig used, standard. Casing used, 85 feet of 10-inch; 515 feet of 8-inch; 730 feet of 6½-inch. Fresh water from 40 to 45 feet; salt water from 400 to 410 feet.	

435. Well near Henryetta, Creek Nation.

[Well begun September 17, 1905; completed October 24, 1905. Authority, J. B. Swan, of Smith & Swan, contractors. No samples.]

This deep well penetrated formations of Pennsylvanian age. The log shows the rocks underlying the pay sands at Henryetta for a depth of 1,300 feet. The top of the Mississippian rocks may be 10,000 feet below the surface, hence endeavors to reach it by drilling in this section are bound to end in failure.

Record of well No. 1, Henryetta.

	Feet.
Surface soil and wash.....	1- 10
White slate.....	10- 101
Hard gray limestone.....	101- 105
Soft white slate.....	105- 205
Soft grayish-blue slate.....	205- 402
White sand; about 2 barrels of water per hour.....	402- 434
White shale.....	434- 510
Grayish-blue slate.....	510- 865
White sand; about 4 barrels of water per hour.....	865- 910
Soft white slate.....	910- 960
Hard gray slate.....	960-1,016
White sand; heavy paraffin oil and gas.....	1,016-1,027
White slate with a few lime shells.....	1,027-1,892
White sand, dry.....	1,892-1,907
Hard gray limestone.....	1,907-2,008
Soft white slate.....	2,008-2,013
Hard gray limestone.....	2,013-2,020
Coal, fine quality.....	2,020-2,024
Hard gray limestone.....	2,024-2,276
Soft gray slate.....	2,276-2,306
Hard sandy lime shell.....	2,306-2,309

Rig used, standard. Casing used, 8¼-inch from surface to 1,097 feet; 6½-inch from 1 foot to 1,097. Water-bearing strata from 402 to 434 and 915 to 960 feet. Nothing of value below 1,027 feet. The oil from the well came out in chunks, was bright yellow in color, turning to light green after melting. It did not flow at a temperature of 60° F. To utilize the gas at 1,016 to 1,027 feet a string of 2-inch casing with Dresser packer was put in. The yield was 250,000 cubic feet in twenty-four hours; initial pressure, 280 pounds.

IOWA.

457. Well at Waterloo, Blackhawk County.

[Well begun in October, 1904; completed in June, 1905. Authority, Waterloo Water Company, owner.
Log compiled from samples by S. Sanford. Geologic correlations by E. O. Ulrich.]

This record is of unusual interest, since it shows a remarkably close agreement with the hypothetical depths of the various strata given by Prof. W. H. Norton in a contribution to Water-Supply and Irrigation Paper No. 145, written some months before drilling began.

No samples were saved to 100 feet, the well being sunk to that point through clay, lime rock, and quicksand streaks, the material caving badly and making progress slow. The formations represented by samples are, to follow Norton's classification: Devonian limestone and shale, Niagara limestone (Silurian); Hudson (or Maquoketa) shale, Galena and Platteville limestone, St. Peter sandstone, Oneota limestone (Ordovician), Jordan sandstone, St. Lawrence dolomite (Cambrian).

Record of city well at Waterloo.

	Feet.
Devonian:	
Brownish limestone with quartz grains and pebbles.....	100- 120
Brownish limy sandstone.....	120- 126
Silurian:	
Light-buff cherty limestone.....	131- 143
Brownish limestone, sandy in places and cherty.....	152- 240
Gray limestone.....	240- 245
White to brownish limestone.....	245- 255
Reddish-brown sandy limestone.....	255- 259
Maquoketa:	
Brownish limestone and gray limy shale.....	259- 265
Gray limy shale, in places brownish.....	265- 425
Galena and Platteville:	
Brownish limestone.....	440- 605
White to reddish limestone.....	605- 635
Soft brownish and grayish limestone.....	635- 815
St. Peter:	
White and gray sandstone.....	815- 862
Brownish limestone and gray sandstone.....	862- 900
Oneota:	
White to brown limestone, in places sandy.....	900- 980
White sandstone.....	1,030-1,045
Light-buff magnesian limestone.....	1,045-1,060
White limy sandstone.....	1,065-1,070
Brownish limestone, in places sandy.....	1,075-1,205
Jordan:	
Brown to gray limy sandstone.....	1,205-1,235
Light-brown sandstone.....	1,235-1,253
Brownish sandy limestone.....	1,253-1,302
St. Lawrence:	
White and brownish magnesian limestone.....	1,302-1,373

Diameter of casing, 15 inches to 200 feet; 9 inches to 470 feet. Diameter of well below, 8 inches. First flow at about 840 feet amounted to about 75 gallons per minute, with a head above street grade of about 18 feet. The flow remained stationary till a depth of 1,362 feet was reached, when there was a considerable increase and the head rose to 20 feet. The flow is about 200 gallons per minute. The well is pumped by a deep-well centrifugal pump and yields 700 gallons per minute. Temperature of the water at well mouth, 56° F.

461. Well at Charles City, Floyd County.

[Well begun in December, 1904; completed in May, 1905. Authority, W. Dennis, city clerk. Log compiled from samples by S. Sanford. Geologic correlations by E. O. Ulrich.]

This well is sunk through rocks of Devonian, Silurian, Ordovician, and Cambrian age. The formations in order are Devonian limestone and shale, Silurian limestone, Maquoketa shale, Galena and Platteville limestones, St. Peter sandstone, Oneota limestone with included New Richmond sandstone, Jordan sandstone, and St. Lawrence limestone and shale.

Record of city well at Charles City.

	Feet.
Devonian:	
Brownish limestone.....	14- 30
Brownish shaly limestone.....	40- 50
Light-buff sandy limestone.....	50- 70
Gray, brown, and buff sandy limestone.....	70- 80
Gray limestone, fossiliferous.....	80- 90
Brown and gray shaly limestone.....	90- 100
Gray limy shale.....	100- 120
Silurian:	
Brown cherty limestone.....	120- 130
Brown limestone.....	130- 160
Maquoketa:	
Gray and brown limestone, fossiliferous from 220 to 270 feet.....	160- 290
Gray limy shale.....	290- 310
Galena and Platteville:	
Drab limestone, more or less magnesian, fossiliferous at 410 feet.....	310- 460
Brownish-gray magnesian limestone.....	460- 470
Brown magnesian limestone, fossiliferous.....	470- 490
Light-brown cherty limestone.....	500- 510
Brownish magnesian limestone.....	510- 540
White, brownish, and grayish, more or less magnesian limestone.....	540- 630
Gray shaly limestone.....	630- 690
Gray limy shale, fossiliferous.....	690- 700
Gray shale, limestone, and sandstone.....	700- 730
Gray shaly sandstone, slightly limy.....	730- 780
(?):	
Gray shaly sandstone and gray shale.....	780- 790
White to gray porous sandstone with streaks of gray shale.....	790- 800
Brownish and gray sandstone and limestone and gray shale.....	800- 820
St. Peter:	
White sandy limestone.....	820- 840
White sandstone.....	840- 870
Shakopee:	
White, brown, and gray magnesian limestone.....	870- 900
New Richmond:	
White limy sandstone, magnesian cement.....	900- 950
White sandstone and gray magnesian limestone.....	950- 970
Oneota:	
Light-gray and brownish magnesian limestone.....	970-1,030
Light-drab magnesian limestone.....	1,030-1,040
White and brownish limestone.....	1,040-1,070
Brownish cherty magnesian limestone.....	1,070-1,080
White to brownish magnesian limestone.....	1,080-1,140
Light brown and white magnesian limestone.....	1,140-1,150
Brownish magnesian limestone.....	1,150-1,180

Jordan:	Feet.
White sandstone.....	1, 180-1, 200
White to gray sandstone, more or less limy.....	1, 200-1, 250
Brownish sandy limestone.....	1, 250-1, 280
No sample.....	1, 280-1, 400
St. Lawrence and Dresbach:	
Gray shaly and sandy limestone.....	1, 400-1, 420
Brownish shaly limestone.....	1, 420-1, 440
Greenish-gray limy shale.....	1, 440-1, 500
Gray limy shale.....	1, 500-1, 520
Dark limy shale.....	1, 520-1, 540
Brownish shaly limestone.....	1, 540-1, 550
Dark limy shale.....	1, 550-1, 570
Dark brownish-gray and gray sandy and limy shale.....	1, 570-1, 590

"I am inclined to think that 'No sample' to, perhaps, 1,440 feet will include all of St. Lawrence. Then greenish-gray limy shale most probably is Dresbach."—E. O. Ulrich.

465. Well at Letts, Louisa County.

[Well begun and completed in 1905. Authority, W. W. Wagner, owner. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by E. O. Ulrich.]

This record, though fragmentary, is of interest from its depth. Many of the samples were washed, making identification of the material penetrated difficult. This particularly applies to the recent and Pleistocene deposits, down to 325 feet. The formations below are Devonian and Silurian limestones and Maquoketa shale, "Trenton" limestone and St. Peter sandstone, of Ordovician age.

Record of well in the SW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 6, T. 75, R. 3.

	Feet.
Clay, sand, gravel, and boulders.....	0- 325
Devonian and Silurian:	
Gray limestone.....	326- 332
Medium coarse brown sandstone.....	332- 342
Brownish limestone.....	345
Medium coarse brown sandstone.....	359
Brownish limestone.....	362- 383
Brownish and grayish fossiliferous limestone.....	385- 440
White to brownish limestone.....	443
White limy sandstone.....	446
Buff sandy limestone.....	463
Brown, white, and gray crystalline limestone.....	468- 545
White fossiliferous limestone.....	578
Brownish and greenish sandy limestone.....	620
Brownish limestone.....	650
Maquoketa:	
Gray and brown limy shale.....	720- 818
"Trenton:"	
Grayish and buff crystalline limestone.....	818- 855
White and brownish limestone.....	860
Reddish crystalline limestone.....	875- 900
Brown, white, and gray cherty limestone.....	913-1,000
White, gray, and brown crystalline limestone.....	1,025
Brownish fossiliferous limestone.....	1,048
Brownish and grayish fossiliferous limestone and gray shale.....	1,063
Brownish limestone.....	1,080-1,095

"Trenton"—Continued.

	Feet.
White to brownish limy sandstone.....	1,105
Gray and brown shale.....	1,125

St. Peter:

Red and white sandstone.....	1,135
Casing used, 10-inch, 300 feet; 8-inch, 338 feet. Main supply of water from below 1,025 feet; water rises within 40 feet of surface; yield and quality not tested. Elevation of well, 630 feet.	

Mr Ulrich says: "The crystalline limestone in this log [from 818 to 1,025 feet] indicates that there is no true Galena in this section, and that the equivalent but crystalline Kimmswick limestone extends northward to this point. This is an interesting and important point that I had hitherto only suspected."

466. Well near Oskaloosa, Mahaska County.

[Well begun and completed in 1905. Authority, R. L. Purell, driller. No samples. Geologic correlations by E. O. Ulrich.]

This well penetrates the drift and rocks of Carboniferous age. The white rock is thought to be Mississippian limestone, in which case the rocks above are to be included in the Pennsylvanian series (Coal Measures).

Record of well 6 miles southeast of Oskaloosa.

Recent and Pleistocene:	Feet.
Yellow loam and clay.....	0 - 26
Pennsylvanian:	
Black shale.....	26 - 31
Gray shale with coal.....	31 - 46½
Black shale with coal.....	46½ - 85½
White clay.....	85½ - 93½
Black shale.....	93½ - 97½
"Boulder".....	97½ - 99
Black shale.....	99 - 102
Soft shale with coal.....	102 - 106
Black shale.....	106 - 116
Sandstone.....	116 - 121
Light fire clay.....	121 - 146
White limestone.....	146 - 166
Dark sandstone.....	166 - 169
Mississippian:	
White rock; water-bearing.....	169 - 221
Rig used, cable. Casing used, 188 feet of 4-inch. Main supply of water at 215 feet. Yield, 3 gallons per minute.	

470. Well at Davenport, Scott County.

[Authority, H. W. Hambrecht, superintendent of L. Wilson Well Company, contractor. No samples. Geologic correlations by E. O. Ulrich.]

This is one of a considerable number of deep wells that have been sunk in the artesian basin that underlies Scott County, Iowa, and Rock Island County, Ill., Davenport having more deep artesian wells than any other city in Iowa.

The rocks penetrated by this well include shales, sandstones, and limestones, ranging in age from Devonian to lower Ordovician. The formations are, from top to bottom, Devonian limestone, Silurian limestone, Maquoketa shale, "Trenton" limestone, St. Peter sandstone, Oneota limestone and sandstone (Ordovician).

Record of well of Davenport Malt and Grain Company.

Drift:	Feet.	
Sand.....	0 -	35
Hardpan and gravel.....	35 -	66
Sandy shale.....	66 -	81
Gravel.....	81 -	91
Loose limestone.....	91 -	92½
Devonian(?):		
Limestone.....	92½ -	99
Caving sand and gravel.....	99 -	102
Sandy limestone.....	102 -	111
Shale.....	111 -	122
Silurian:		
White limestone.....	122 -	283
Sandy shale.....	283 -	298
Sandy limestone.....	298 -	421
Brown limestone.....	421 -	432
Maquoketa:		
Blue shale.....	432 -	506
Limestone.....	506 -	596
Limestone and blue shale.....	596 -	636
Sandy shale.....	636 -	661
Gray shale.....	661 -	761
"Trenton:"		
Limestone.....	761 -	929
Flinty limestone.....	929 -	931
Brown limestone.....	931 -	996
Caving limestone.....	996 -	1,003
Blue and gray shale.....	1,003 -	1,025
St. Peter:		
Sandstone.....	1,025 -	1,087
Oneota:		
Shale and caving rock.....	1,087 -	1,117
Limestone.....	1,117 -	1,156
Limestone and blue shale.....	1,156 -	1,162
Limestone and shale, caving.....	1,162 -	1,184
Limestone and shale.....	1,184 -	1,201
Red marl and limestone.....	1,201 -	1,250
Sandy limestone.....	1,250 -	1,290
Sandstone.....	1,290 -	1,350
Gray limestone.....	1,350 -	1,450
Brown limestone.....	1,450 -	1,575
Sandy limestone.....	1,575 -	1,653

Diameter of well, 12 to 5½ inches. Casing used, 92½ feet of 12-inch to rock, 20 feet of 9-inch, 40 feet of 6½-inch, 81 feet of 5½-inch. Well began to flow at 1,400 feet. Flow, 150 gallons per minute.

471. Well at Ottumwa, Wapello County.

[Well begun in May, 1904; completed in May, 1905. Authority, L. Nichols, driller. No samples. Geologic correlations by E. O. Ulrich.]

Though this record mentions only the formations below 1,240 feet, the location and depth of the well make the record important. The formations given are of Ordovician age.

Record of John Morrell Packing Company's well No. 5:

	Feet.
Limestone.....	1, 240-1, 260
Green shale.....	1, 260-1, 276
White sandstone.....	1, 276-1, 314
Limestone with streaks of shale.....	1, 314-1, 325
White sandstone.....	1, 325-1, 330
Limestone.....	1, 330-1, 355
Sandstone.....	1, 355-1, 365
Limestone.....	1, 365-1, 423
Sand or sandy limestone.....	1, 423-1, 451
Limestone with crevices.....	1, 451-1, 485
White sandstone.....	1, 485-1, 543
Limestone with streaks of sandstone.....	1, 543-1, 565
Limestone.....	1, 565-1, 622
Sandy limestone.....	1, 622-1, 632
Limestone.....	1, 632-1, 665
White sandstone.....	1, 665-1, 680
Sandy limestone with crevices.....	1, 680-1, 745
Limestone.....	1, 745-1, 790
Sandy limestone or hard sandstone.....	1, 790-1, 835
Limestone.....	1, 835-1, 850
Sandy limestone or hard sandstone.....	1, 850-1, 877
Sandstone.....	1, 877-1, 896
Hard limestone.....	1, 896-2, 025
Sandstone with streaks of limestone.....	2, 025-2, 098
Same as above but thicker streaks, 15 to 20 feet.....	2, 098-2, 160
Hard limestone.....	2, 160-2, 190
Sandy limestone.....	2, 190-2, 205

All rocks between 1,451 and 1,896 feet water-bearing. First flow struck at about 1,100 feet (probably in St. Peter sandstone), 1,000 gallons per minute. Flow increased to about 1,400 gallons per minute from 1,451 to 1,899 feet.

KANSAS.

477. Well near Laharpe, Allen County.

[Well begun July 25, 1905; completed August 10, 1905. Authority, E. T. Stanley, driller. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations checked by E. O. Ulrich.]

This well is in the famous natural-gas field that covers a considerable area about Iola. The gas is found in sandstone lentils in the Cherokee shale, the bottom member of the Pennsylvanian series of the Carboniferous system of rocks in southeastern Kansas and northern Indian Territory. The formations penetrated by this gas are all included in the Pennsylvanian series. They are, in descending order, Iola limestone, Chanute shale, Bronson limestone, Dudley shale, Parsons limestone, Bandera shale, Pawnee limestone, Labette shale, Fort Scott limestone, Cherokee shale.

The geology of the gas field has been described at some length in Bulletin No. 238, "Economic geology of the Iola quadrangle," by George I. Adams, Erasmus Haworth, and W. R. Crane.

Record of well No. 1, on F. E. Farmer addition, in the NE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 27, T. 24, R. 19.

Iola:	Feet.
Yellow clay with bits of brownish limestone.....	10- 20
White to brownish limestone.....	20- 45
Chanute:	
Gray limy shale.....	45- 65
Brown limestone.....	65- 85
Gray and brownish-gray limy shale.....	85-125
Bronson:	
Brownish limestone.....	125-190
Black shale.....	190-195
Grayish and brownish limestone.....	195-215
Black shale with brownish limestone.....	215-220
Brownish limestone and a little dark shale.....	220-274
Dudley:	
Gray shale.....	274-418
Parsons:	
Light brownish-gray limestone.....	418-439
Bandera:	
Gray shale.....	439-445
Gray and greenish sandy and limy shale, with gray limestone.....	445-460
Brownish-gray limy sandstone and dark-gray shale.....	460-510
Pawnee:	
Gray limestone.....	510-550
Labette:	
Black limy shale and dark-brown limestone.....	550-590
Fort Scott:	
Brownish-gray limestone.....	590-620
Cherokee:	
Black shale.....	620-625
Black shale and brownish limestone.....	625-635
Black shale, impure coal, and brownish limestone.....	635-640
Gray shale and granular thin-bedded limestone.....	640-700
Gray shale.....	700-735
Dark gray and brownish shale, slightly limy.....	735-800
Black shale; lentils of brownish limestone.....	800-820
Medium brownish-gray sandstone.....	820-890
Dark-gray to black sandy shale and gray sandstone.....	890-908
Rig used, cable. Casing used, 8-inch, 0 to 273 feet; 6 $\frac{1}{4}$ -inch, 273 to 850 feet. Water-bearing strata at 215 to 225 and 470 to 500 feet. Initial yield of gas about 3,000,000 cubic feet in twenty-four hours. Initial pressure, 220 pounds.	

483. Well near Strong City, Chase County.

[Well begun August 20, 1904; completed March 27, 1905. Authority, George W. Crum, of the Strong City Gas, Oil, and Mineral Company, owner. No samples preserved above 1,500 feet; complete series below.]

This well was sunk as a prospect. The nearest deep well is at Emporia, about 18 miles east. Neither oil nor gas was found in paying quantity, but the log is of interest, since samples of cuttings were preserved at 5 to 15 foot intervals below 1,500 feet. The driller seems to have noted all changes in the formations, but his descriptions are not exact enough to render the log above 1,500 feet of much value, hence it is not given in detail.

Rocks of Permian age outcrop in the higher ground about Strong City, but the rocks penetrated by this well all belong to the Pennsylvanian series (Coal Measures) of the Carboniferous system. Owing to the imperfect character of the log above 1,500 feet, it is not possible to correlate the formations with those that outcrop in the State farther to the east.

Record of well in the SE. $\frac{1}{4}$ SE. $\frac{1}{4}$ sec. 17, T. 19, R. 8.

	Feet.
Boulders and clay	0- 8
White slate, brown sandstone, white slate, and red sandstone	8- 20
Slate	20- 26
Gravel; caves	26- 28
Green shale; caves	28- 30
Blue slate	30- 40
Flint	40- 46
White slate and shelly slate	46- 110
Black shale, muddy; caves	110- 120
Slate and muddy slate; caves	120- 145
Limestone, slate, limestone, slate, and limestone	145- 210
Red shale; caves	210- 225
Slate	225- 230
Black shale and black limestone	230- 245
Slate, blue slate, limestone, white slate, limestone, and white slate	245- 340
Gas sand; gas burned 4 feet high	340- 349
Fine sandstone; salt water	349- 354
Shelly slate	354- 370
Black and sandy shale	370- 380
Slate, sandy slate, and shelly slate	380- 445
Black shale	445- 455
Shelly slate, limestone, brown shale, shells and limestone, brown shale and shelly slate	455- 560
Black limestone	560- 595
Slate, limestone, and slate	595- 700
Green shale	700- 720
Limestone, white slate, sandy shale, slate, limestone, and slate	720- 845
Sand; salt water	845- 860
Sandy slate, dark-blue slate, and white slate	860- 900
Sand; salt water	900- 905
White slate, shale, and limestone	920- 995
Sand; salt water	995-1,000
Black shale	1,000-1,015
Sandy shale and white shelly slate	1,015-1,100
Sand; salt water	1,100-1,135
Black shale and black limestone	1,135-1,150
Sand; salt	1,150-1,185
Black shale and black limestone	1,185-1,200
Shale, sandy shale, white slate, and shelly slate; salt water at 1,350 feet.	1,200-1,350
Slate and sandy slate	1,350-1,430
Black sand	1,430-1,432
White sand, sand (salt water), fine black sand	1,432-1,460
Light sand, white sand, dark sand, fine light sand	1,460-1,490
Black shale	1,490-1,495
Sand; salt water	1,495-1,500
Brown and gray limestone and gray shale, 35 feet; brown limestone and gray shale, 20 feet	1,500-1,555

	Fect.
Light-brown limestone.....	1,565-1,580
Dark-brown and brown ferruginous limestone.....	1,580-1,590
Brown limestone and gray shale.....	1,590-1,605
Gray limestone, 5 feet; light and dark brown limestone, 5 feet; gray limestone, 5 feet; light brownish-gray limestone, 5 feet; drab limestone, 5 feet; brownish limestone, 5 feet.....	1,605-1,635
Brownish limestone and light and dark gray shale.....	1,635-1,685
Brownish-gray limestone.....	1,685-1,690
Brownish and brown limestone and dark-gray shale.....	1,695-1,700
Slate (brownish sandy limestone and gray shale).....	1,700-1,705
Sandy limestone and slate (same limestone and shale as above).....	1,705-1,720
Sandy slate (brown limestone).....	1,720-1,725
Slate and sandy slate (gray and dark-gray limy shale).....	1,725-1,745
Sandy and shelly slate (drab and brown limy shale).....	1,745-1,755
Hard slate and limestone (gray limestone and gray limy shale).....	1,755-1,765
Sandy lime and sand (light brownish-gray limestone).....	1,765-1,790
Black slate (dark-gray to black sandy and limy shale).....	1,790-1,795
Hard shelly slate (light-brownish limestone and gray shale).....	1,795-1,800
Sandy slate (gray sandy limestone, brownish-gray, light-brown, and light and dark gray limestone).....	1,800-1,825
Sand (gray limestone).....	1,825-1,840
Sandy slate and slate (light and dark gray limestone and dark shale).....	1,840-1,865
Slate and sandy slate (gray limestone and dark-gray shale).....	1,865-1,875
Sand and slate (drab limestone).....	1,890-1,905
Slate (gray limestone and dark-gray limy shale).....	1,905-1,920
Slate (light-brown limestone and dark-gray shale).....	1,920-1,945
"Mississippi limestone" (sample doubtful).....	1,945-1,960

Rig used, cable. Diameter of well, 14 inches from 0 to 400 feet; 10 inches from 400 to 1,000 feet; $6\frac{1}{2}$ inches from 1,000 to 1,500 feet; $4\frac{3}{4}$ inches from 1,500 to 1,945 feet. At 1,600 feet strong brine overflowed the casing.

As this well apparently started about 200 feet below the top of the Garrison formation, which is taken as the uppermost member of the Pennsylvanian, or Coal Measures series of Kansas, and as the Coal Measures are about 2,700 feet thick, the bottom of the well was probably 500 feet above the Mississippian, but may have reached the Cherokee shale.

487. Well near Burlington, Coffey County.

[Well begun in December, 1904; completed in January, 1905. Authority, Loy & Wilson, contractors. No samples.]

This is the log of a wild-cat well, not credited with having found oil or gas. The rocks belong to the Pennsylvanian division of the Carboniferous system, the driller stopping at the underlying "Mississippi limestone" (Boone formation). The hole shows the full thickness of the Cherokee shale and the included limestone (or sandstone) lentils. The well apparently started above the horizon of the Oread limestone, or over 1,000 feet above the top of this shale. While most of the intervening formations have been studied by surface outcrops and well records in the Iola quadrangle to the southeast, variations in thickness of the various beds of limestone and shale make correlation difficult.

Record of well No. 1 on Clark farm, $\frac{1}{4}$ miles west and 1 mile south of Burlington.

	Fect.
Soil.....	0- 10
Shale.....	10- 65
Limestone.....	65- 105
Shale.....	105- 256

	Feet.	
Limestone.....	256-	268
Shale.....	268-	425
Limestone.....	425-	512
Shale.....	512-	524
Limestone.....	524-	640
Sandstone.....	640-	680
Black slate.....	680-	684
Limestone.....	684-	689
Sandy shale.....	689-	740
Limestone.....	740-	795
Slate.....	795-	802
Limestone.....	802-	832
Shale.....	832-	837
Slate.....	837-	841
Limestone.....	841-	844
Shale.....	844-	849
Limestone.....	849-	855
Shale.....	855-	1,038
Limestone.....	1,038-	1,048
Shale.....	1,048-	1,125
Limestone.....	1,125-	1,129
Shale.....	1,129-	1,145
Limestone.....	1,145-	1,150
Shale.....	1,150-	1,185
Limestone.....	1,185-	1,195
Shale.....	1,195-	1,415
"Flint".....	1,415-	1,417
Shale.....	1,417-	1,425
Limestone.....	1,425-	1,430
Shale.....	1,430-	1,457
"Mississippi limestone".....	1,457	

Casing used, 6 $\frac{1}{4}$ -inch, 846 feet; 4 $\frac{7}{8}$ -inch, 1,185 feet.

492. Well near Junction City, Geary County.

[Well begun April 21, 1905; abandoned September 28, 1905. Authority, C. P. Fogelstrom, president Junction City Oil and Mining Company. No samples.]

This well is of interest from its location and depth. The deepest well in the same section of the State is at McFarland, 30 miles east. The nearest important oil and gas producing area is in Allen County, about 95 miles southeast. The Junction City well starts at the base of the Permian, or at the top of the Pennsylvanian series. As the McFarland well shows the Coal Measures to be there more than 2,500 feet thick, it is doubtful if the Junction City well penetrated the bottom member of the series, the Cherokee shale. Incidentally, the log shows the necessity of starting a well to go through the upper shales of the Pennsylvanian of central Kansas with a large diameter, owing to the caving of the beds.

Record of Munson well No. 1, in the NE. $\frac{1}{4}$ NW. $\frac{1}{4}$ NW. $\frac{1}{4}$ sec. 10; T. 12, R. 5.

	Feet.	
Sand and gravel.....	0-	18
No entry.....	18-	40
Slate.....	40-	75
Limestone.....	75-	105
Red rock.....	105-	120
Slate.....	120-	140

	Fect.
Red rock.....	140- 147
Limestone.....	147- 182
Slate.....	182- 207
Limestone.....	207- 229
Shale.....	229- 241
Red rock.....	241- 268
Limestone.....	268- 313
Shale.....	313- 363
Limestone.....	363- 383
Black shale.....	383- 450
Limestone; three bailers of salt water per hour.....	450- 455
Shale.....	455- 495
Limestone.....	495- 510
Shale.....	510- 550
Sand: salt water at 565 feet.....	550- 600
Shale.....	600- 680
Limestone.....	680- 705
Shale.....	705- 715
Limestone.....	715- 770
White slate.....	770- 810
Limestone.....	810- 855
Shale.....	855- 870
Limestone.....	870- 885
Slate.....	885- 908
Limestone.....	908- 920
Black shale.....	920- 952
Limestone.....	952- 970
Sand.....	970- 993
Black sand; 4 bailers of salt water per hour.....	993-1,030
Limestone.....	1,030-1,051
Slate.....	1,051-1,080
Limestone.....	1,080-1,153
Shale.....	1,153-1,183
Limestone.....	1,183-1,193
Slate.....	1,193-1,211
Sand.....	1,211-1,226
Limestone.....	1,226-1,290
Sand; salt water at 1,300 feet.....	1,290-1,315
Limestone.....	1,315-1,375
Shale.....	1,375-1,407
Limestone.....	1,407-1,427
Slate.....	1,427-1,445
Shale.....	1,449-1,458
Limestone.....	1,458-1,498
Shale.....	1,498-1,505
Limestone.....	1,505-1,535
Break, cave.....	1,535-1,547
Limestone.....	1,547-1,630
Shale.....	1,630-1,642
Limestone.....	1,642-1,670
Shale.....	1,670-1,680
Limestone.....	1,680-1,740

	Feet.
Black shale.....	1,740-1,800
Flint.....	1,800-1,816
Slate.....	1,816-1,820
Sand.....	1,820-1,840
Slate.....	1,840-1,930

Rig used, standard. Casing used, 10-inch to 35 feet, 8 $\frac{1}{4}$ -inch to 630 feet, 6 $\frac{1}{4}$ -inch to 1,449 feet, 4 $\frac{1}{8}$ -inch to 1,610 feet.

Mr. Fogelstrom says: "This was the second well drilled for the Junction City Oil and Mining Company. This was abandoned on account of being started too small. A light flow of oil was struck near the bottom, but soon water was again struck and, being unable to case it off, drilling was abandoned."

498. Well near McPherson, McPherson County.

[Well begun in 1904; drilling stopped in June, 1905. Authority, Jeff Tourney, of McPherson Prospecting Company, contractor. Samples preserved. Log compiled from samples by S. Sanford.]

This well is in the northern portion of the Kansas salt field, and the samples give a good idea of the formations penetrated to its depth of 2,225 feet. But one deeper well has been put down in the salt fields. That one, having a depth of 2,335 feet, is at Anthony, about 85 miles to the south. The deepest well in the State, at Caney, was down 2,600 feet on March 1, 1906. The McPherson well starts in a formation of earliest Quaternary age, the "Equus beds;" below 140 feet comes the Wellington, and below that the Marion formation (Permian). The well penetrates the highest limestones and shales of the Pennsylvanian series of the Carboniferous system. As these beds differ somewhat from those exposed at the surface farther east, where they have been given formation names, no attempt is made to group the beds as formations or to separate the Permian from the Pennsylvanian.

Record of well 3 miles west of McPherson.

	Feet.
Yellowish gravel and sand; water-bearing.....	20- 80
Brownish-gray sandstone; water bearing.....	80- 140
Soft blue-gray limy shale.....	140- 234
Soft red limy shale.....	234- 239
Soft blue-gray limy shale (hard white stratum at 320-324 feet).....	239- 390
Gray limy shale, harder (rock salt at 390-391 feet).....	390- 420
Rock salt and soft gray shale (driller's log says "top of thick salt bed at 450 feet").....	420- 470
Rock salt.....	470- 530
Rock salt and gray shale (driller's log says "bottom of pure salt at 545 feet").....	530- 545
Grayish gypsum.....	545- 600
Gray gypsum and gray limy shale.....	600- 660
Soft gray shale with white and grayish gypsum.....	660- 685
White and grayish gypsum.....	685- 695
White gypsum and gray gypsiferous and limy shale.....	695- 750
Gray limy and gypsiferous shale (driller's log says "black shale at 720-800 feet").....	750- 770
Gray limestone and gray shale.....	775- 800
Gray limestone.....	800- 855
Gray limestone and gray limy and gypsiferous shale (driller's log says "white limestone").....	855- 905
Gray limestone and limy shale.....	905- 915
Gray limestone, alternate strata of light and dark below 950 feet.....	915- 980
Light brownish-gray limestone (driller's log says "salt water").....	980-1,005

Feet.

Gray, impure limestone.....	1, 005-1, 030
Gray limestone and gray limy and gypsiferous shale.....	1, 030-1, 050
Gray limestone and red and gray limy shale.....	1, 050-1, 100
Red shaly limestone.....	1, 100-1, 105
Gray limestone, red shale, dark and light gray limy shale.....	1, 105-1, 150
Light-gray limestone and dark-gray limy shale.....	1, 150-1, 175
Gray limestone.....	1, 175-1, 200
Light and dark-gray limestone and limy shale (driller's log says "black shale at 1,200-1,260 feet").....	1, 200-1, 240
Light and dark gray and dark-red limestone and limy shale.....	1, 240-1, 260
Light and dark gray and dark-red limestone.....	1, 260-1, 275
Light and dark gray limestone and limy and gypsiferous shale.....	1, 275-1, 290
Light and dark gray and dark-red limy shale.....	1, 290-1, 320
Brownish limestone and light and dark gray fossiliferous limy shale.....	1, 355-1, 425
Gray limestone and limy shale.....	1, 425-1, 475
Dark-red shaly limestone (driller's log says "black shale at 1,475-1,570 and red rock at 1,570-1,575 feet").....	1, 475-1, 570
Gray shaly limestone and gray limy shale (log says "black slate").....	1, 570-1, 600
Gray shale, dark-red shale, and gray limy shale.....	1, 600-1, 605
Light and dark gray limy shale (driller's log says "black shale").....	1, 605-1, 620
Dark-red limy shale and gray shaly limestone (driller's log says "red rock at 1,620-1,625 feet").....	1, 620-1, 630
Dark-gray, slightly limy shale.....	1, 630-1, 675
Dark-gray to black shale, not limy (driller's log says "black shale at 1,675-1,680 feet").....	1, 675-1, 678
Dark-gray shale and dark-brown limestone.....	1, 678-1, 680
Dark-red and dark-gray limy shale and brownish fossiliferous limestone (driller's log says "white lime").....	1, 680-1, 690
Gray and dark-gray limy shale (log says "black shale").....	1, 690-1, 740
Brownish limestone, fossiliferous below 1,755 feet, and dark-gray limy shale (log says "white lime at 1,740-1,755 feet").....	1, 740-1, 770
Brownish limestone, light-gray shaly limestone, and dark-gray limy shale (log says "black shale").....	1, 770-1, 820
Red limy shale.....	1, 820-1, 832
Gray and red limy shale (log says "black shale").....	1, 832-1, 870
Dark-gray shale and brownish sandy limestone (log says "black sand and water").....	1, 870-1, 890
Dark-gray shale, gray sandstone, and brownish limestone (log says "gray sand and water").....	1, 890-1, 900
Brownish-red sandy oolitic (?) limestone with streaks of gray limy shale....	1, 900-1, 910
Soft gray shale.....	1, 910-1, 930
Light-brown, probably fossiliferous limestone, and dark-gray limy shale....	1, 930-1, 940
Gray limy shale, black shale, and coal (?).....	1, 940-1, 970
Gray shale and gray sandy limestone.....	1, 970-1, 990
Brownish limestone, dark-gray limy shale, light-gray shale, and pyrite.....	1, 990-2, 005
Dark-gray shale and light-gray and light-brown limestone.....	2, 005-2, 035
Brownish limestone and dark-gray shaly limestone.....	2, 035-2, 045
Brownish fossiliferous limestone with sandy streaks and dark-gray shaly limestone.....	2, 045-2, 055
Light-gray and brownish fossiliferous limestone and dark-gray shale.....	2, 055-2, 065
Brownish-gray and gray oolitic limestone with streaks of dark-gray limy shale or shaly limestone.....	2, 065-2, 135
Gray oolitic limestone and dark-gray shale.....	2, 135-2, 140

	Feet.
Same limestone with pyrite.....	2, 140-2, 160
Brownish-gray oolitic magnesian limestone with streaks of dark-gray shale, with pyrite below 2,170 feet.....	2, 160-2, 180
Gray shale and gray limestone with pyrite below 2,190 feet.....	2, 180-2, 200
Brownish-gray sandy limestone, possibly fossiliferous, and dark-gray shale..	2, 200-2, 225
No oil or gas was found in paying quantity.	

605. Well near Bonner Springs, Wyandotte County.

[Well begun March 8, 1905; completed April 19, 1905. Authority. T. B. Wood, owner. Samples preserved. Geologic correlations checked by E. O. Ulrich.]

The log of this well seems to have been kept with unusual care, the driller's notes and the record shown by the samples, most of which were taken at 5-foot intervals, agreeing almost exactly. All the formations belong to the Carboniferous system, the drill passing through the lower portion of the Pennsylvanian series and reaching the underlying limestone of the Mississippian. The well starts at about the horizon of the Iola limestone. The Cherokee shale is shown to be over 465 feet thick. The limestone first penetrated is believed to be the Iola.

Record of well No. 1 on Thomas Kinahan farm, in the NE. $\frac{1}{4}$ SW. $\frac{1}{4}$ sec. 21, T. 11, R. 23.

	Feet.
Soft black soil.....	0- 3
Iola:	
Hard yellowish limestone; water at 10 feet.....	3- 24
Soft gray limestone and shale.....	24- 33
Hard yellowish limestone.....	33- 41
Hard gray sandy limestone.....	41- 59
Hard gray limestone.....	59- 68
Soft black limy shale.....	68- 74
Hard gray limestone.....	74- 90
Soft blue limy shale.....	90-100
Hard gray limestone.....	100-102
Soft blue shale.....	102-108
Hard white, gray, and brown limestone.....	108-135
Soft blue limy shale; enough water to drill.....	135-139
Soft black shale.....	139-144
Hard gray limestone.....	144-162
Soft gray shale.....	162-164
Hard white limestone.....	164-166
Soft black shale.....	166-168
Hard dark limestone.....	168-178
Soft brown and blue limy shale.....	178-190
Hard dark limestone.....	190-193
Hard gray sandstone and shale.....	193-205
Soft dark shale, sandy and limy.....	205-217
Soft dark limy sandstone.....	217-227
Soft gray shale, with brownish limestone at 232-242 feet.....	227-282
Soft gray, yellow, and brown limestone.....	282-292
Soft purple shale.....	292-294
Soft gray and brown sandy and limy shale.....	294-334
Soft gray sandy shale.....	334-344
Hard gray and brown limestone.....	344-356
Soft gray shale.....	356-370
Fort Scott: Hard brownish-gray limestone.....	370-378

Cherokee:

	Feet.
Soft dark grayish and purplish shale	378-385
Soft dark limestone; gas at 391 feet	385-391
Soft black shale and coal	391-395
Soft gray sandy shale and shaly limestone	395-403
Soft dark-reddish shale	403-408
Soft dark shale with gray shaly limestone at 418-433 feet	408-443
Soft gray limestone and brown and dark-gray sandstone	443-490
Soft dark gritty shale and sandstone	490-505
Soft dark-brown sandstone and dark shale	505-530
Hard dark-gray sandy limestone	530-535
Soft gray limy and sandy shale	535-540
Soft red and gray shale	540-550
Soft dark-gray shale	550-560
Soft gray limy shale	560-565
Soft dark-gray shale with limy layers	565-611
Soft red shale	611-619
Soft light and dark gray shale	619-635
Soft black shale	635-645
Soft gray limestone and gray sandstone	645-655
Soft dark bluish-gray shale and gray sandstone	655-680
Soft gray shale	680-709
Soft dark-gray, black, and brownish shale and gray limestone	709-746
Soft brown and gray limy sandstone with black shale at 770-775 feet	746-810
Soft brown sandy limestone	810-820
Soft brown limy sandstone	820-845
Hard brown limestone, Mississippian (?)	845-853

Rig used, cable. Casing used, 10-inch, 31 feet; 8½-inch, 369 feet; 6¼-inch, 510 feet; 5-inch, 709 feet. Enough water to drill with was found at 139 and 400 feet. A small flow of gas was struck at 391 feet, and at 440 feet the flow increased to 200,000 feet in twenty-four hours. A trace of oil was found at 505 to 510 feet, and a strong vein of salt; sulphur water at 770 feet, with a trace of oil. The well was plugged at 743 to 720, 550 to 518, and 510 to 460 feet; an 8½-inch packer was set at 436 feet and the gas from 440 feet saved. The rock pressure of this was 120 pounds.

"The 99 feet of limy sandstone, from 746 to 845 feet, probably corresponds to the bed at 767 to 865 feet in well No. 606. Perhaps the sandstone is Winslow formation and the limestone Morrow formation."—E. O. Ulrich.

606. Well near Bonner Springs, Wyandotte County.

[Well begun in July, 1898; completed in February, 1899. Authority, S. J. Hatch. No samples. Geologic correlations by E. O. Ulrich.]

This well record is of interest in connection with the preceding one, since the log shows not only the thickness of the Cherokee shale, the bottom member of the Pennsylvanian, but the underlying Mississippian limestones. A fossil shell brought up from 2,065 feet was pronounced by E. O. Ulrich to be probably a crushed specimen of *Dinorthis subquadrata*, indicating that the limestone bed from which it came corresponds in age to the Maquoketa shale of the central Mississippi Valley, the uppermost Ordovician, which, west of Mississippi River, immediately overlies the Trenton. The well penetrates the Pennsylvanian and Mississippian series (Carboniferous) and rocks of Devonian, Silurian, and Ordovician age.

Record of well one-half mile north of Bonner Springs.

Iola to Pleasanton:	Feet.
Limestone and shales.....	0- 203
Pleasanton:	
Shales.....	203- 365
Pleasanton to Fort Scott and Cherokee:	
Limestone and shales.....	365- 464
Cherokee:	
Shales; gas at 391 and 559 feet.....	464- 767
Winslow and Morrow (?):	
Sand; full of salt water.....	767- 865
Hard dark limestone.....	865- 894
Mississippian:	
Light-colored limestone containing flint.....	894-1,056
Gray and brown limestone containing flint.....	1,056-1,193
Dark-brown gritty limestone.....	1,193-1,273
Light-blue shale, with 2 feet of very hard limestone at the base.....	1,273-1,296
Brown crystalline limestone.....	1,296-1,337
Blue slaty shale.....	1,337-1,341
Purple and white limestone, soft at bottom.....	1,341-1,391
Limestone, reddish and flinty at top, gray and soft at bottom.....	1,391-1,449
Devonian (?):	
Gray and bluish to dark fossiliferous limestone.....	1,449-1,524
Sandstone, clear white at top, darker and reddish at the bottom; salt, sulphur water at 1,525 feet.....	1,524-1,569
Silurian (?):	
Limestone with partings of grayish shale.....	1,569-1,744
Gray and dark limestone with porous layers and seams of shale.....	1,744-1,907
Ordovician:	
Variously tinted limestone, some parts porous, others very close grained..	1,907-2,150
Casing used; 400 feet of 8 $\frac{1}{4}$ -inch, 900 feet of 6 $\frac{1}{4}$ -inch, 1,350 feet of 4 $\frac{7}{8}$ -inch. Elevation of well mouth about 800 feet.	

KENTUCKY.**626. Well at Nebo, Hopkins County.**

[Well completed October 19, 1905. Authority, E. F. Doudna, contractor.]

This log shows the various strata overlying the No. 12 coal in Hopkins County, in the western coal field of Kentucky. The rocks are all of Carboniferous age and belong to the Coal Measures or Pennsylvanian series.

Record of well at Nebo.

	Feet.
Clay.....	0 - 15
Shale.....	15 - 68
Coal.....	68 - 69
Shale.....	69 - 95
Limestone and shale.....	95 - 99
Coal.....	99 -100
Limestone and shale.....	100 -106
Shale.....	106 -109
Soft gray sandstone.....	109 -121
Shale.....	121 -186
Coal.....	186 -189
Fire clay.....	189 -193

	Feet.
Sandstone.....	193 -195
Shale.....	195 -210
Soft gray sandstone.....	210 -220
Shale.....	220 -225
Hard white sandstone.....	225 -260
Crystal rock (soft limy shale containing quartz crystals).....	260 -266
Shale.....	266 -268
Soft gray shale.....	268 -271
Hard white limestone.....	271 -274
White shale or slate, mixed with lime.....	274 -279
Hard white limestone.....	279 -283
Very hard blue limestone.....	283 -285
Black slate.....	285 -287½
Coal, No. 12.....	287½-291½

630. Well near Edmonton, Metcalfe County.

[Well begun in May, 1905; completed in July, 1905. Authority, H. L. Sturm, contractor. Incomplete series of samples preserved. Geologic correlations by E. O. Ulrich.]

The rocks penetrated are included in the Tullahoma limestone (Mississippian), Devonian black shale, and Devonian, Silurian, and Ordovician limestones.

Record of well No. 1 on J. A. Hamilton farm, 2 miles east of Edmonton.

Tullahoma:	Feet.
Limestone.....	0- 205
Devonian:	
Black shale.....	205- 245
Speckled limestone.....	245- 265
Silurian and Ordovician:	
Gray to light-brown limestone.....	265- 887
Soft magnesian limestone, known as "Pencil cave".....	887- 893
Hard white limestone.....	893-1,000
Gray limestone.....	1,000-1,475
White and brown limestone.....	1,475-1,575
Brownish-gray crystalline limestone, cherty in upper portion and sandy below 1,640 feet.....	1,575-1,653
Rig used, cable. Diameter of casing, 6½ inches; length, 250 feet. First water at 80 feet; sulphur water at 219 feet. Small show of oil at 30 feet.	

MAINE.

666. Well at Fort Levett, Cumberland County.

[Well begun July 7, 1905; completed October 31, 1905. Authority, Capt. A. W. Gates, quartermaster. Samples preserved.]

This well is of interest from its being sunk on an island in Portland Harbor, at a point where, previous to an investigation of the occurrence of underground water in rocks of similar character on islands in Portsmouth Harbor, it had been thought that a sufficient supply of potable water could not be obtained by drilling. The rocks comprise metamorphosed sediments and intrusive igneous rocks.

Record of well at Fort Levett, 3 miles southeast of Portland.

	Feet.
Soil.....	0- 18
Medium hard to hard dark sandstone.....	40- 50
Hard light sandstone or gneiss.....	50- 60
Hard blue rock.....	60- 80

	Feet.
Softer shaly rock.....	80- 90
Hard blue rock.....	90-100
Same rock; with quartz veins.....	100-115
Hard light-blue rock (gray gneiss).....	115-150
Hard dark rock (gneiss).....	150-160
Hard light rock (fine gray gneiss or schist).....	160-170
Hard blue rock (dark-gray gneiss).....	170-190
Hard white rock (gneiss) containing iron.....	190-250
Light-gray rock (gray gneiss) containing iron.....	250-265
Soft dark-gray rock with iron.....	265-275
Very hard dark-gray rock with some iron.....	275-280
Hard light-gray rock with iron.....	280-290
Hard dark-gray rock with iron.....	290-320

Rig used, cable. Diameter of well, 8 and 6 inches. Length of casing, 26 feet. Well pumped 2 gallons per minute at 26 feet, 5 gallons at 45 feet, and 7 gallons from 60 to 160 feet. Well was filled in from 320 to 280 feet, and in a forty-eight-hour test pumped 33.9 gallons per minute. Temperature of water, 48.5° F.

MARYLAND.

674. Well at Annapolis, Anne Arundel County.

[Well begun in 1904; completed in 1905. Authority, N. M. Shannahan, president J. H. K. Shannahan Artesian Well Company, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

This well obtains water from beds in the Potomac group. The formations penetrated, in downward order, are Aquia formation of the Pamunkey group (Eocene); Matawan formation (marine Cretaceous); Magothy formation; and the Raritan and Patapsco formations of the Potomac group (early Cretaceous).

Record of well at United States Naval Academy, Annapolis.

Recent:	Feet.
Made ground.....	0- 20
Aquia:	
Coarse orange-colored sand with some clay and bits of shells.....	20- 40
Coarse greenish to orange-colored sand with some clay.....	40- 60
Matawan:	
Fine greenish sand and dark clay.....	60-140
Magothy:	
Very tough drab clay.....	140-180
Medium light-gray sand with streaks of light-colored clay; sand water-bearing, flowing water.....	180-220
Raritan:	
Tough clay with fine white sand.....	220-250
Fine sand with flowing water.....	250-270
Coarse water-bearing sand; flowing water.....	270-306
Tough red clay.....	306-340
Pink and red clay with coarse sand.....	340-360
Coarse brownish sand; water-bearing.....	360-400
Coarse light-buff sand; water-bearing.....	400-415
Pink clay containing gravel.....	415-435
Crust of iron ore.....	435
Varicolored sand; water-bearing.....	435-465
Crust of iron ore.....	465
Varicolored sand; water-bearing.....	465-510
Crust of iron ore.....	510

Patapsco:	Feet.
Dark-blue clay	510-516
Very tough red or pink clay (crust of iron ore at 524 and 545 feet)	516-548
Yellow sand; lower portion coarse and water bearing	548-583
Pink clay	583-587
Coarse sand and gravel, pebbles one-half inch in diameter; large flow of water.	587-601
Very hard rock	601

Rig used, rotary to 250 feet, hollow-rod jumper below. Casing used, 250 feet of 12-inch, 170 feet of 10-inch, 181 feet of 8-inch. Length of strainer, 15 feet. Well flows 75 gallons per minute at elevation of 8 feet above tide. Supply from 587 to 601 feet. Water contains iron, but is of excellent quality when filtered.

687. Well at Chaptico, St. Mary County.

[Well begun January 9, 1905; completed February 2, 1905. Authority, L. Rude, driller. Geologic correlations by W. B. Clark.]

This well, starting in deposits of Columbia (early Pleistocene) age, penetrates clays, sands, and greensands of the Calvert formation of the Chesapeake (Miocene) group and Nanjemoy and Aquia formations of the Pamunkey (Eocene) group. A detailed account of the underground-water resources of that section of the Coastal plain in which this well is situated is given in the *Nomini folio* (No. 23) of the Geologic Atlas of the United States.

Record of well at Chaptico.

Columbia:	Feet.
Coarse yellow sand and gravel	1- 20
Calvert:	
Hard dark sandy clay	20- 70
Hard, coarse grayish-brown sand containing shell fragments	70- 80
Hard dark sand and limy clay	80-100
Hard dark coarse sand	100-120
Nanjemoy:	
Hard dark coarse sand with glauconite	120-250
Aquia:	
Soft light-brown sandy clay	250-270
Hard dark sand containing glauconite; water-bearing	270-295
Rig used, jct. Diameter of well, 1½ inches. Main water supply at 270 to 291 feet.	
Well flows 7 gallons per minute; static head, +22 feet.	

689. Well near Tilghman, Talbot County.

[Well begun March 10, 1905; completed March 21, 1905. Authority, L. Rude, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

The water-bearing stratum of dark sand in this well possibly belongs to the top of the upper (marine) division of the Cretaceous and is part of the Matawan formation; according to Mr. Rude, it is about 60 feet thick. The formations penetrated, from top to bottom, are Columbia formation (Pleistocene); Calvert formation of the Chesapeake group (Miocene); Pamunkey group (Eocene); and Matawan formation (Cretaceous).

Record of well one-half mile north of Tilghman post-office.

Columbia:	Feet.
Hard buff clay	0- 12
Calvert:	
Soft micaceous gray sand with a little glauconite	12- 18
Soft dark brownish-gray micaceous sand	18- 40
Gray sand containing shell fragments	40- 50
Hard dark-gray sandy micaceous clay	50-130

Pamunkey:	Feet.
Soft rock (glauconite with a little sand and gravel); a little water	130-155
Hard black earth (dark clay with much glauconite, a little sand, and some bits of shells)	155-340
Hard dark sand (glauconite with coarse sand, and bits of shells); some water.	340-360
Pamunkey or Matawan:	
Hard dark sand (less glauconite and more grains of brownish quartz than preceding; some bits of shells); plenty of water	360-380
Rig used, jet. Diameter of well, 1½ inches. Length of casing, 366 feet; strainer at 360 feet. Well pumps 10 gallons per minute.	

MASSACHUSETTS.

702. Well at South Hadley Center, Hampshire County.

[Well begun November 15, 1904; completed March 6, 1905. Authority, Ernest Lyon, driller. Samples preserved. Geologic correlations by S. Sanford.]

After passing through the sand and hardpan of the drift (Pleistocene) this well struck the brown, gray, and red sandstones and thin beds of shale that have been classified as the Longmeadow sandstone formation. This is one of the four formations into which the rocks of the Triassic (Newark) system in Connecticut River Valley have been divided in Massachusetts and is the best water bearer of the four. An account of some of the wells drilled in the Triassic rocks of Connecticut River Valley and a consideration of these rocks as water bearers are contained in Water-Supply and Irrigation Paper No. 110, "Contributions to the hydrology of the eastern United States," by M. L. Fuller.

Record of well at South Hadley Center.

Drift:	Feet.
White sand	0- 20
Hardpan with boulders	20- 45
Longmeadow sandstone:	
Soft brown sandstone	45- 80
Soft black sandstone	80-100
Soft brown sandstone	100-120
Soft black sandstone	120-160
Hard brown sandstone	160-200
Soft black sandstone	200-220
Hard dark-gray sandstone	220-270
Soft black shale	270-350
Soft brown sandstone	350-370
Soft red sandstone	370-390
Soft black sandstone	390-410
Soft red sandstone	410-450
Soft black sandstone	450-470
Hard dark-brown sandstone	470-490
Hard dark-red sandstone	490-520
Soft black shale	520-540
Hard dark-red sandstone	540-600
Soft black shale	600-714

Diameter of well, 6 inches, with 45 feet of casing to ledge. Well pumps 40 gallons per minute from a depth of 100 feet, the water level being 60 feet below surface.

MINNESOTA.

723. Well at South Minneapolis, Hennepin County.

[Authority, Chicago, Milwaukee and St. Paul Railway, owner. No samples.]

Minneapolis is near the center of an artesian basin that underlies a considerable area in southeastern Minnesota. The rock strata forming the basin are of Ordovician and Cambrian age. The formations penetrated by this well, below the drift, are, according to the nomenclature of the Minnesota Survey: "Trenton" limestone, St. Peter sandstone, Shakopee limestone, New Richmond sandstone, Oneota limestone (Ordovician); Jordan sandstone, St. Lawrence sandstone, shale and limestone, and Dresbach sandstone (Cambrian)

Record of well at South Minneapolis.

	Feet.
Soil and surface material.....	0- 56
"Trenton" limestone.....	56- 84
St. Peter sandstone.....	84-250
Shakopee dolomite.....	250-260
New Richmond sandstone.....	260-267
Oneota dolomite.....	267-390
Jordan sandstone.....	390-478
Dresbach sandstone.....	478-704

Well has brick curb, 0 to 20 feet; casing from 20' to 184 feet; no casing below

727. Well at Fergus Falls, Ottertail County.

[Well begun October 4, 1904; completed April 15, 1905. Authority, John Shogren, driller. Samples preserved.]

This well is sunk wholly through beds of clay and sand that were deposited during the Ice Age by glaciers or by streams deriving their waters largely from glaciers. It shows how deeply this glacial material has covered the old rock surface at some localities and how irregular is the distribution of water-bearing beds.

Record of well at State Hospital for the Insane, Fergus Falls.

	Feet.
Black soil.....	0- 2
Soft yellow clay.....	2- 56
Hard blue clay and sand with numerous boulders from 64 to 120 feet.....	56-120
Soft gray sand; some water.....	102-215
Soft blue clay.....	215-224
Soft gray sand.....	224-241
Soft blue clay.....	241-249
Hard blue clay.....	249-260
Hard gray clay and sand.....	260-314
Gray gravel; water-bearing; well pumps 45 gallons per minute, water standing 97 feet from surface.....	314-315
Hard gray, dry sand.....	315-358
Hard gray "shale" and clay.....	358-400
Gray gravel; main water supply.....	400-420
Hard, blue clay.....	420-422

Rig used, cable. Casing used, 12-inch, 0 to 215 feet; 10-inch, 180 to 366 feet; 8-inch, 300 to 325 feet; 6-inch, 310 to 400 feet. Water stands at 97 feet from surface. Well pumps 100 gallons per minute from a depth of 160 feet. Quality, hard, alkaline.

728. Well at Groningen, Pine County.

[Well begun July 1, 1904; completed August 10, 1904. Authority, A. J. Carey, of the St. Paul Artesian Well Company, contractor. Samples preserved.]

The sandstones which underlie the soil and clay, the latter deposited during the Ice Age, form part of a very old formation dating back to early Paleozoic time. The sandstone is locally known as the "Kettle River sandstone" and is believed to be a part of what has been called the "Basal Sandstone series," of middle Cambrian age.

Record of well at Groningen.

	Feet.
Black soil.....	0- 3
Red clay.....	3- 18
Red sand; water-bearing.....	18- 30
Orange sandstone.....	30- 39
Very hard pink sandstone with light-buff beds from 75 to 110 feet.....	39-320

Rig used, cable. Diameter of well, 8 inches. Length of casing, 34 feet. A small stream of water was struck at 175 feet, but the principal supply is from 300 to 320 feet. Water rises within 22 feet of surface and was not lowered by pumping 260 gallons per minute.

MISSISSIPPI.

735. Well near Bay St. Louis, Hancock County.

Well begun September 18, 1905; completed September 28, 1905. Authority, John L. Ford, driller. Samples preserved. Geologic correlations checked by E. C. Eckel.]

The formations penetrated by this well are clays, sands, and gravels varying in age from Quaternary to late Tertiary (Pliocene). The water-bearing beds have been developed by a great number of wells along the Gulf coast of Mississippi.

Record of well 1¼ miles southwest of Bay St. Louis.

	Feet.
Quaternary:	
Yellow sand.....	0- 10
White sand.....	10- 20
Brown sand; contains glauconite.....	20- 40
Grand Gulf:	
Greenish clay.....	40- 90
Sand and gravel.....	90-180
Greenish clay.....	180-500
Medium fine light-gray sand; water-bearing; will flow about 75 gallons per minute.....	500-565
Greenish, slightly sandy clay and shale.....	565-805
Coarse gray sand; water-bearing.....	805-920

Rig used, jet. Diameter of well, 4 inches. Main supply of water at 890 to 920 feet; flows 400 gallons per minute at surface. Static head not determined.

742. Well near Mississippi City, Harrison County.

[Well begun January 6, 1905; completed January 16, 1905. Authority, John L. Ford, driller. Samples preserved. Geologic correlations checked by E. C. Eckel.]

This well, like most of those along the Gulf coast of Mississippi, develops a water-bearing gravel that occurs in the Grand Gulf formation, which is of Pliocene age. The formations overlying the Grand Gulf are of Quaternary age and include the Biloxi sand and Pontchartrain clay.

Record of well at De Buys station, 3 miles west of Mississippi City.

Quaternary:	Feet.
White sand, with pumping water.....	5- 10
Brown sand, with pumping water.....	10- 30
Shells and mud.....	30- 50
White sand.....	50- 95

Grand Gulf:	
Green clay.....	95-145
Fine gray sand; water-bearing; water does not rise to surface.....	145-156
Very hard green clay.....	156-234
Fine gray sand; water-bearing; well flows about 10 gallons per minute.....	234-257
Greenish clay.....	257-600
Fine gray sand; water-bearing.....	600-705

Rig used, jet. Diameter of well, 3 inches. Water from 685 to 705 feet; flows 225 gallons per minute and has a static head estimated at +85 feet.

745. Well near Vancleave, Jackson County.

[Well begun July 4, 1905; completed July 12, 1905. Authority, John L. Ford, driller. Sample preserved. Geologic correlations by E. C. Eckel.]

This well develops a bed of water-bearing sand in the Grand Gulf formation, which was deposited in late Pliocene time. Overlying the Grand Gulf are sands that represent the Lafayette formation.

Record of well of L. N. Dantzer Lumber Company, 1½ miles southwest of Vancleave.

Lafayette (?):	Feet.
Hard yellow sandy clay.....	0- 10
Soft fine yellow sand.....	10- 30
Brownish gravel and coarse sand.....	30- 80

Grand Gulf:	
Hard green sandy clay.....	80-250
Light-gray sand; water-bearing.....	250-295
Green sandy clay.....	295-680
Sand (no sample); water-bearing.....	680-747

Rig used, jet. Diameter of well, 3 inches. Strainer from 727 to 747 feet. Well flows 125 gallons per minute. Static head not determined.

747. Well near Ellisville, Jones County.

[Well begun October 1, 1905; completed November 1, 1905. Authority, W. C. Porter, contractor and driller. Incomplete series of samples preserved. Geologic correlations checked by E. C. Eckel.]

The clay first penetrated may belong in part to the Lafayette formation (Pliocene). The underlying sands and clays are classified as Grand Gulf (Pliocene)

Record of well of Ellisville Lumber Company.

Lafayette (?) in part:	Feet.
Clay.....	0- 90

Grand Gulf:	
Coarse sand.....	90-110
Blue clay and marl.....	110-257
Coarse white sand.....	257-288

Rig used, rotary and jet. Diameter of well, 6 inches. Main supply at 257 to 287 feet. Water stands 21 feet from surface.

748. Well at Holly Springs, Marshall County.

[Well begun July 20, 1905; completed August 4, 1905. Authority, A. Goldsberry, driller. Incomplete set of samples preserved. Geologic correlations checked by E. C. Eckel.]

The sands penetrated down to 20 feet belong to the Lafayette formation (Pliocene). The sands, sandstones, and clays below are of Tertiary age and probably comprise the Wilcox ("Lignitic") group, which, as a water bearer, is one of the most important divisions of the Tertiary in Mississippi.

Record of well of Holly Springs Light and Water Company.

Lafayette:	Feet.
Dry sand	0 - 20
Wilcox:	
Pipe clay	20 - 34
Sand; water-bearing; water rises within 19 feet of surface	34 - 56
Hard blue clay	56 - 64
Dry sand	64 - 88
Fine to medium light brownish-gray micaceous sand; water-bearing	88 - 102
Rock and sandstone	102 - 104
Blue clay	104 - 209
Rock	209 - 209½
Fine sand	209½ - 285
Clay	285 - 306
Medium varicolored sand, pink to light brown, with pink clay	306 - 316
Medium to coarse yellowish sand; water-bearing	316 - 348½

Rig used, rotary. Diameter of well, 8 inches. Strainer from 325½ to 348½ feet. Water rises to 174 feet below surface. Good quality. Well yields 200 gallons per minute.

749. Well at Newton, Newton County.

[Well begun April 1, 1905; completed August 1, 1905. Authority, P. J. Doyle, contractor. No samples. Geologic correlations checked by E. C. Eckel.]

This log is the deepest reported from Newton County. The formations shown are the Claiborne and Wilcox or "Lignitic" (Eocene), and the Ripley (late Cretaceous).

Record of well of Newton Oil and Manufacturing Company.

Claiborne:	Feet.
"Quicksand"	0 - 35
Hard clay and shells	35 - 187
Hard, packed dry sand	187 - 262
Wilcox:	
Lignite	262 - 266
Fine sand	266 - 313
Green clay	313 - 329
Rock	329 - 331
Green clay	331 - 397
Very hard clay	397 - 415
Soft clay and sand	415 - 428
Hard clay and sandstone	428 - 568
Soft clay	568 - 610
Ripley:	
Layers of green clay and sandstone	610 - 812
Coarse water-bearing sand	812 - 842

Rig used, rotary and jet. Casing, 8-inch to 659 feet; 6-inch, with 30-foot strainer, below. Water rises within 70 feet of surface.

750. Well at Sardis, Panola County.

[Well begun in May, 1905; completed May 26, 1905. Authority, C. E. Thomas, of Illinois Central Railroad, owner. Samples preserved. Geologic correlations checked by E. C. Eckel.]

This well is sunk in yellow and buff clay of the Lafayette (?) formation (Pliocene) and varicolored sands of the Wilcox or "Lignitic" group (Eocene).

Record of well at Sardis depot.

	Feet.
Lafayette (?):	
Yellow clay.....	0- 40
Buff clay.....	40- 60
Wilcox:	
Buff sand.....	60- 90
Salmon-yellow sand.....	90-110
Light-red sand.....	110-145
Buff and light-buff sand.....	145-175
Coarse sand and gravel.....	175-185
Fine yellow sand.....	185-210

Rig used, rotary. Diameter of casing, 10 inches; length, 190 feet; length of strainer, 20 feet (from 170 to 190 feet). Water-bearing stratum at 185 to 210 feet. Well pumps 210 gallons per minute.

MISSOURI.

844. Well near Kansas City, Jackson County.

[Authority, S. J. Hatch. No samples. Geologic correlations by E. O. Ulrich.]

The log of this well gives data supplementing the logs of wells Nos. 605 and 606. The rock last penetrated, as shown by a sample from the drill core between 2,348 and 2,404 feet, was a biotite granite. This sample indicates that the drill passed through all the Paleozoic formations present and the record shows the thickness of these formations below the base of the Coal Measures, at 750 feet. The record is presumably accurate. Mr. Hatch states that the core was destroyed by a fire.

Record of well 10 miles southeast of Kansas City.

	Feet.
Lower Coal Measures.....	0- 750
Boone limestone (?):	
Limestone, shelly in places, with shale partings.....	750- 825
Light-colored limestone with flinty layers.....	825-1,085
Dark limestone with shelly layers.....	1,085-1,185
Dark-reddish sand.....	1,185-1,200
Joachim (?): Bluish, fine-grained limestone, shelly in places.....	1,200-1,257
St. Peter: Sandstone, white at top, reddish at bottom.....	1,257-1,321
Cambro-Ordovician:	
Gray and brown limestone.....	1,321-1,450
Shelly or clayey limestone.....	1,450-1,460
Light, coarse porous limestone.....	1,460-1,620
Shelly limestone.....	1,620-1,640
White sandstone.....	1,640-1,656
Flinty, light porous limestone; water disappeared or was lost.....	1,656-1,730
Gray clayey and sandy limestone.....	1,730-1,750
Hard gray fine-grained limestone.....	1,750-1,820
Hard gray fine-grained sandstone.....	1,820-1,835
Gritty, porous crystalline limestone, in places white and flinty.....	1,835-2,050
Hard, coarse sandstone.....	2,080-2,100

Cambrian:	Feet.
Limestone with seams of gray and brown shale.....	2, 100-2, 140
Dark and light fine-grained limestone.....	2, 140-2, 250
Hard coarse sandstone.....	2, 280-2, 348
Granite.....	2, 348-2, 401
Rig used, diamond drill. Elevation of well mouth, 925 feet.	

MONTANA.

1038. Well 40 miles northwest of Belton, Flathead County.

[Well begun and abandoned in 1904. Authority, J. C. Leonard, driller. No samples.]

The rocks penetrated by this well are faulted and folded, so it is impossible to say how many times a single bed is repeated in the section given by the log. The rocks are of Cretaceous age.

Record of well in the SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 12, T. 36, R. 21.

	Feet.
Wash, gravel, and boulders.....	0- 18
Soft brown clay.....	18- 30
Soft gray shale.....	30- 45
Coal.....	45- 47
Soft gray shale.....	47- 100
Hard white limestone.....	100- 110
Soft gray shale.....	110- 140
Soft gray sandstone; a little water.....	140- 145
Hard white limestone.....	145- 178
Hard gray sandstone; water.....	178- 182
Hard gray limestone.....	182- 206
Hard gray fine-grained sandstone.....	206- 225
Soft red shale.....	225- 240
Soft gray sandstone.....	240- 265
Hard gray gritty limestone.....	265- 270
Coal.....	270- 274
Soft black shale.....	274- 276
Soft gray shale.....	276- 312
Hard gray sandstone; more water.....	312- 320
Soft brown shale.....	320- 358
Coal.....	358- 360
Soft gray shale; caves.....	360- 400
Soft brown shale.....	400- 450
Soft blue shale.....	450- 580
Soft brown shale.....	580- 613
Coal.....	613- 615
Soft gray shale; caves.....	615- 665
Soft brown shale; caves.....	665- 695
Hard gray limestone.....	695- 723
Hard gray sandstone; oil colors.....	723- 746
Soft gray shale.....	746- 800
Soft gray sandstone; water.....	800- 820
Hard limestone.....	820- 850
Soft shale; caves badly.....	850- 880
Soft gray sandstone.....	880- 905
Hard gray limestone.....	905- 930
Soft gray shale.....	930- 970
Soft dark sandstone.....	970- 990

	Feet.
Hard gray limestone.....	990-1,020
Hard gray sandstone; water.....	1,020-1,024
Very hard white gritty limestone.....	1,024-1,045
Soft white sandstone; water.....	1,045-1,060
Very hard white limestone.....	1,060-1,075
Medium hard gray sandstone.....	1,075-1,160
Hard gray limestone.....	1,160-1,190
Soft brown shale.....	1,190-1,214
Very hard white limestone with iron pyrite.....	1,214-1,226
Soft gray sandstone; very strong flow of water.....	1,226-1,234
Soft brown shale; shells.....	1,234-1,236
Hard white limestone.....	1,236-1,340

Drilling stopped by water breaking in at bottom of casing. Rig used, cable. Casing used, 13-inch, 24 feet; 10-inch, 341 feet; 8-inch, 904 feet; 6-inch, 1,330 feet.

1039. Well near Altyn, Teton County.

[Well begun in June, 1904; drilling stopped March 14, 1905. Authority, W. A. Leonard, driller. Samples preserved.]

This well was put down near the eastern edge of the great series of pre-Cambrian (Algonkian) rocks, shales, sandstones, quartzites, and limestones that constitute the mass of the Front Range of the Rocky Mountains in the northwest corner of Montana. These rocks are nearly horizontal, but are known to overlie at depth rocks of much later age (Cretaceous), this inverse relation being due to a great thrust fault. Seepages of oil at various points have caused many oil claims to be located and have led to some deep drilling. All the rocks penetrated by this well are probably of Algonkian age.

Record of well 8 miles southeast of Altyn.

	Feet.
Dark-gray gritty shale.....	20- 150
Dark-gray limestone, sandy from 300 to 350 feet.....	150- 400
Sample missing.....	400- 500
Dark-gray shale and white limestone.....	500- 800
Hard black shale.....	800- 840
Soft gray shale.....	840- 850
Hard gray limy sandstone.....	850- 870
Hard brown limy sandstone; slight show of oil.....	870- 880
Sample missing.....	880- 890
Hard dark-gray and brownish sandstone.....	890- 900
Soft brownish-black sandstone; a little oil.....	900- 920
Dark-gray sandy shale.....	920- 930
Soft light-brown limestone and dark-gray shale.....	930- 965
Hard black limestone; formation broken, full of crevices.....	965- 990
Hard dark-gray shale.....	990-1,010
Hard light-gray limestone and dark-gray shale.....	1,010-1,040
Hard gray gritty limestone.....	1,040-1,075
Hard gray and brown sandstone.....	1,075-1,085
Hard gray limestone, upper layers gritty.....	1,085-1,120
Hard gray magnesian limestone and red shale.....	1,140-1,160
Hard light and dark-gray limestone.....	1,160-1,170
Sample missing.....	1,170-1,180
Hard light and dark-gray limestone and shale.....	1,180-1,190
No sample.....	1,190-1,200
Medium hard gray sandy limestone.....	1,200-1,220

	Feet.
Hard light- and dark-gray sandy limestone; formation full of crevices.....	1, 220-1, 260
Medium hard sand shell and lime (no sample); small amount of gas.....	1, 260-1, 270
Hard gray sandy limestone or layers of sandstone and limestone; caving formation from 1,285 to 1,305 feet	1, 270-1, 350
Medium hard gray sandy magnesian limestone.....	1, 350-1, 400
No sample.....	1, 400-1, 415
Hard gray gritty limestone.....	1, 415-1, 460
Hard brown limy sandstone.....	1, 460-1, 475
Medium hard gray gritty limestone.....	1, 475-1, 530
Rig used, cable; casing used, 55 feet of 10-inch; 265 feet of 8-inch; 345 feet of 6-inch.	
No water found below 15 feet.	

NEW JERSEY.

1061. Well at Fort Hancock, Monmouth County.

[Well begun January 20, 1905; completed March 10, 1905. Authority, H. C. Harper for Thos. B. Harper, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

This well is on the end of Sandy Hook. The formations below the recent and possibly Pleistocene sands were deposited in the Cretaceous period. They belong to the upper or marine division of the Cretaceous and include the Matawan formation.

Record of well at Fort Hancock.

Recent and Pleistocene:	Feet.
Beach sand (medium gray sand).....	5- 20
Coarse gray sand; brackish water.....	20- 25
Beach sand (medium fine gray sand).....	25- 50
Matawan:	
Very coarse water-bearing gravel (fine gray gravel).....	50- 65
Fine gray gravel (sample is coarse yellow and white sand).....	65- 80
Fine yellow, reddish, and gray sand.....	80-100
Fine yellowish sand (sample is dark gray), with "petrified wood".....	100-125
Light-gray gravel, with shells.....	125-130
Fine light-blue clay.....	130-240
Fine gray micaceous sand.....	240-263
Mixed blue clay and sand (sample is very fine dark sand).....	263-300
Magothy:	
Fine light-gray micaceous sand, with "charcoal".....	300-330
Fine white sand; some water.....	330-363
Yellow gravel (coarse varicolored sand); water-bearing.....	363-365

Diameter of well, 8 inches. Length of casing, 325 feet, with strainer from 325 to 365 feet. Principal supply from 363 to 365 feet. Well pumps 60 gallons per minute.

NEW MEXICO.

1077. Well near Artesia, Eddy County.

[Well begun in May, 1905; completed July 8, 1905. Authority, E. L. Robertson, contractor. No samples.]

Pecos River Valley, from Roswell to McMillan, has become one of the most beautiful and densely populated sections of New Mexico, through the development of a remarkable underground-water supply. This well is not among the largest sunk in the valley, but it shows what bountiful flows may be obtained by proper care in sinking and casing. The beds of clay, sand, and gravel, down to 780 feet, are of post-Tertiary age, and partly fill an old rock valley. The underlying sandstone and hard limestone are part of the Carboniferous system. A detailed account of the geology of part of Pecos River Valley and the development of the artesian water is given in Water-Supply and Irrigation Paper No. 155, "Geology and underground-water resources of the Roswell artesian basin," by C. A. Fisher.

Record of well in the NW. $\frac{1}{4}$ sec. 32, T. 16, R. 26.

	Feet.
Soil and clay.....	0-60
Clay and gravel.....	60-150
Light clay.....	150-250
Red clay.....	250-375
Rock; water-bearing at 378 to 380 feet; flow about 10 gallons per minute.....	375-380
Clay.....	380-420
Sand.....	420-575
Rock; water-bearing; flow about 300 gallons per minute.....	575-580
Red sand.....	580-625
Sandstone or packed sand.....	625-780
Hard limestone; strong flow of water at 830 to 860 feet.....	780-933

Rig used, rotary. Diameter of casing, 6 inches; length of casing, 625 feet; water at 380 and 580 feet cased off. Well flows 680 gallons per minute. Static head, about +90 feet. Quality of water, hard; used for all domestic purposes and for irrigation.

1120. Well near Torrance, Torrance County.

[Authority, El Paso and Northeastern Railway, owner. No samples.]

This record shows the alternating beds of red shale and sandstone, dark shales, white sandstone, and limestone that characterize the Red Beds, a series of rocks that range in age from Carboniferous into Jurassic. In this case the rocks are believed to be of Carboniferous age. The water level of this well is over 300 feet below surface, but at a well near Pastura, on the same railroad, water level is 636 feet below surface. The region is arid and the rocks are poor water carriers.

Record of well 1 mile southwest of Torrance.

	Feet.
Limestone and gypsum.....	0-28
Red shale.....	28-93
Limestone.....	93-139
Blue shale.....	139-147
Red shale.....	147-155
Limestone.....	155-163
Blue shale.....	163-189
Limestone.....	189-193
Soft shale.....	193-213
Red shale.....	213-258
Limestone.....	258-274
Sandstone.....	274-287
Red clay.....	287-298
Red shale.....	298-316
Brown shale.....	316-334
Red shale.....	334-382
Red clay.....	382-412
Red shale.....	412-430
Gypsum; small vein of water at 440 feet.....	430-454
Red shale.....	454-535
Red sandstone; vein of water at 550 feet.....	535-551
White sandstone.....	551-606
Yellow sandstone.....	606-634
Gray sandstone.....	634-676
Yellow sandstone.....	676-692
Gray sandstone and shale.....	692-809

	Feet.
Slate and shale.....	809-823
Red clay.....	823-826
Gray sandstone.....	826-853

Elevation of well mouth, 6,460 feet. Water rises to -357 feet.

NEW YORK.

1163. Well near Getzville, Erie County.

[Well begun January 1, 1903; completed February 22, 1903. Authority, Fred Stahl, driller. No samples. Geologic correlations by F. B. Weeks.]

This well gives a section at a small gas pool, the Getzville, in Erie County. The rocks penetrated belong to the Silurian system and the Lockport limestone, Rochester shale, and Medina sandstone and shale are represented.

Record of well No. 1 on George G. Wolf farm, 2 miles south of Getzville.

	Feet.
Drift:	
Clay.....	1- 40
Gravel; fresh water; rose 30 feet.....	40- 45
Lockport:	
White limestone; black sulphur water at 330 feet.....	45-410
Rochester:	
Black slate; no water.....	410-485
White limestone; gas.....	485-495
Black slate.....	495-505
Medina:	
Red sandstone; some gas.....	505-565
Black slate.....	565-575
Blue sandstone: gas sometimes.....	575-605
Soft red shale; no gas; no water.....	605-800

Rig used, cable. Diameter of casing, 8 and 6 inches; length, 420 feet. Initial pressure of gas, 280 pounds.

Mr. Weeks says: "The peculiar thing of this section is the thickness, 365 feet, of white limestone (Lockport); at the falls it is about 175 feet."

1195. Well near Saratoga Springs, Saratoga County.

[Well begun and completed in 1905. Authority, E. J. Saunders, driller. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by F. B. Weeks.]

The Saratoga springs occur along fault fissures and, owing to the faults and the lack of outcrops, the geology of the district has not been worked out in detail. The rocks penetrated by this well are thought to include the Utica shale and Trenton limestone (Ordovician) to 420 feet and the Beekmantown limestone (late Cambrian) below.

Record of well at Geyersville, near Saratoga Springs.

	Feet.
Yellow clay.....	1- 16
Utica shale:	
Black gritty shale, slightly limy.....	17-360
Trenton:	
Dark-gray to black fossiliferous limestone.....	360-370
Dark-gray to black limy shale, fossiliferous.....	370-390
Dark siliceous limestone, fossiliferous.....	390-410
No sample.....	410-420

Beekmantown:	Feet.
Cherty light and dark gray siliceous limestone.....	420-500
Light-gray siliceous limestone and dark shale.....	500-525
Dark-gray to black siliceous limestone.....	525-600
Dirty-gray siliceous limestone.....	600-625
Light-gray siliceous limestone with black shale.....	625-650
Dark-gray to black siliceous limestone.....	650-670

NORTH CAROLINA.

1217. Well at Kinston, Lenoir County.

[Well begun in 1904; completed in 1905. Authority, L. J. Mewborne, city clerk. Samples preserved
Log compiled from samples by E. F. Lines. Geologic correlations by W. B. Clark.]

The formations shown by the log are of Cretaceous age. The record is of interest as being the deepest reported from Lenoir County.

Record of Kinston city well.

Ripley:	Feet.
Black sandy calcareous clay.....	16- 53
Greenish sand with harder layers ("rock" at 60 feet), loosely consolidated by lime, fossiliferous.....	53-104
Black sandy calcareous clay.....	104-111
Ripley or Eutaw (?):	
Greenish sand.....	111-113
Black sandy calcareous clay; hard layers at 160 feet.....	113-193
Eutaw:	
Same clay with pyrite; hard layers at 203 feet.....	193-213
Gray sand, shell fragments, and wood.....	213-219
Brownish-black sandy clay.....	219-239
Black clay.....	239-291
Gray clay and fine sand.....	291-304
Gray sand.....	304-310

Casing used, 300 feet of 10-inch; 40 feet of 8-inch, with 12-foot strainer. Main supply of water from below 300 feet flows 12 gallons per minute. Static head, +24 feet. Water is depressed to -150 feet by pumping 150 gallons per minute. Temperature of water at well mouth, 64° F. Quality, very soft. This is one of several wells used for city supply.

1218. Well at Fort Caswell, New Hanover County.

[Well begun February 12, 1900; drilling stopped April 1, 1902. Authority, T. T. Allard, civil engineer.
No samples. Geologic correlations by W. B. Clark.]

This well is of interest from the fact that no sufficient supply of fresh water was found, in this respect resembling the deep well sunk at Wilmington, about 20 miles to the north. The beds above 240 feet are thought to belong to the Tertiary and Quaternary systems; those below to the Ripley formation of the Cretaceous system.

Record of well at Port Caswell.

Recent and Pleistocene:	Feet.
Gray sand.....	0- 10
Sand and shells.....	10- 30
Blue clay.....	30- 45
Sand.....	45- 50
Mud and sand with 1 foot of rock.....	50- 55
Gray sand, gravel, and shells.....	55- 60
Gray sand and clay.....	60- 65
Sand.....	65- 70

Eocene:	Feet.
Limestone, sand, and soft limestone	70- 80
Limestone, upper 20 feet soft	85-135
Sand, clay, and limestone	135-220
Cemented sand and lime	220-240
Ripley:	
Blue clay with lime	240-280
Blue clay	280-365
Sand and marl in thin strata; salt water stood at 365 feet	365-550
Fine sand and clay with 2 feet of flint at 700 feet and 2 feet of flinty limestone at 719 feet	550-800
Sandstone	800-801

Length of casing, 12-inch, 90 feet; 10-inch, 250 feet; 8-inch, 719 feet; 6-inch, 800 feet. Water overflows top of casing at rate of 25 gallons per minute. Quality, brackish; contains 80 grains salt per gallon.

1220. Well at Pinehurst, Moore County.

[Well begun in May, 1905; completed in October, 1905. Authority, T. B. Cotter, general superintendent, of Pinehurst. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by W. B. Clark.]

Pinehurst is near the western edge of the Atlantic Coastal Plain. The well passes through the basal clays, sands, and arkoses of the Potomac formation (Cretaceous) and penetrates the underlying greenish crystalline schists for 475 feet.

Record of well at hotel, Pinehurst.

Potomac:	Feet.
Light-brownish sandy clay or arkose	54
Light-buff and light-gray clayey sand	65- 80
Light-gray clayey sand	100
Dark sandy clay	111
Light-buff, slightly clayey sand	128
Brown sandy clay	147
Light-brown clayey sand	160
Pre-Cambrian:	
Brownish, grayish, and greenish sandy clay, an arkose, or the oxidized top of the schist	191
Coarse crystalline schist; contains quartz, feldspar, mica and a black to greenish silicate	207
Crystalline schist, sometimes fine, sometimes coarse with oxidized zones at 391, 400, and 408 feet	207-457
Gray gneiss with quartz vein	457
Coarse crystalline schist	465-500
Dark and light schist containing much quartz and chlorite	520-595
Fine dark gneiss	600-655

Rig used, cable. Diameter of well, 6 inches; depth, 681 feet. Water rises within 100 feet of surface. Well pumps over 100 gallons per minute.

OHIO.

1256. Well near Reekbridge, Hocking County.

[Well begun March 30, 1905; completed May 17, 1905. Authority, R. H. Derry and John Huddleston, drillers. Samples preserved. Geologic correlations by S. Sanford.]

This well gives an interesting section in the Sugar Grove pool, the most important natural-gas reservoir in Ohio outside of the Trenton pools. The rocks penetrated range in age from Carboniferous to Silurian. The formations are Pottsville (Pennsylvanian), Logan group, Cuyahoga and Sunbury shale and Berea sandstone (Mississippian), Bedford and Ohio shales and Onondaga limestone (Devonian), Helderberg and Niagara limestones, Clinton limestone and shale (Silurian).

Record of well No. 7 on Charles Wharton farm, Good Hope Township, 3 miles southwest of Rockbridge.

	Feet.	
Soft red or orange sand	0-	1
Soft orange and yellow sand and clay, a rotten clayey sandstone; landed 8-inch drive pipe at 43 feet.....	1-	43
Pottsville (?) and Logan:		
Soft buff sandstone.....	43-	85
No record or sample.....	85-	125
Soft red, buff, and light-buff sandstone.....	125-	190
Soft white and light-gray sandstone; fresh soft water was struck at 175 feet; at 340 feet the water rises to within 150 feet of surface.....	190-	340
Soft brownish sandstone.....	340-	380
Soft light-gray gritty sandstone.....	380-	420
Harder gray limy sandstone, very gritty.....	420-	440
No record or sample.....	440-	450
Cuyahoga and Sunbury:		
Soft gray shale.....	450-	530
Soft gray limy sandstone.....	530-	550
Soft dark-gray shale.....	550-	620
Soft black shale.....	620-	640
Very soft dark-gray shale.....	640-	660
Berea:		
Hard light-gray limy sandstone; show of oil and a little gas.....	660-	665
Hard dove-colored sandstone—salt water; sandstone is about 33 feet thick.....	665-	685
Bedford:		
Soft gray gritty shale.....	685-	700
Soft red shale.....	700-	780
Ohio:		
Soft black, dark-gray, and black shale.....	780-	875
Soft gray shale.....	875-	1,000
Soft black or dark-gray shale.....	1,000-	1,165
Soft dark-brown, slightly limy shale.....	1,165-	1,205
Harder and darker, more or less limy shale.....	1,205-	1,265
Hard gray limy shale.....	1,265-	1,285
Hard dark-brown shale.....	1,285-	1,305
Hard and soft dark brownish-gray limy shale.....	1,305-	1,365
Soft light-gray limy shale.....	1,365-	1,370
Soft dark-gray, almost black shaly limestone.....	1,370-	1,390
Soft light-gray limy shale.....	1,390-	1,504

Onondaga, Helderberg, and Niagara:		Feet.
Hard gray and white limestone.....		1, 504-1, 565
Hard gray and brownish limestone—little more salt water at 1,585 feet, about five-sixths gallon per minute.....		1, 565-1, 660
Hard brown limestone.....		1, 660-1, 760
Hard brown and gray limestone.....		1, 760-1, 800
Hard dark-gray limestone.....		1, 800-1, 810
Hard gray and brown limestone.....		1, 810-1, 885
Hard brown limestone.....		1, 885-1, 925
Hard brownish, grayish, and brownish limestone; at 1,950 feet hole filled with salt water to within 600 feet of surface.....		1, 925-2, 065
Hard dove-colored limestone.....		2, 065-2, 105
Hard brownish and gray limestone.....		2, 105-2, 165
Clinton:		
Soft brownish-gray limy shale.....		2, 165-2, 240
Soft gray limy shale.....		2, 240-2, 270
Soft gray limestone and shale.....		2, 270-2, 280
Soft light-brown limy shale.....		2, 280-2, 294
Clinton sand (hard gritty light-gray limestone and dark-gray shale), 30 feet thick.....		2, 294-2, 324
Diameter of well, 8 inches from 0 to 700 feet; 6½ inches from 700 to 2,135 feet. Length of casing, 2,135 feet. Gas found in Clinton sand; estimated yield, 1,250,000 cubic feet in twenty-four hours.		

1269. Well near Ava, Noble County.

[Well completed September 21, 1904. Authority, Jacob Von Gunten, driller. No samples.]

This test hole for coal was sunk on a hill about 3 miles west of Ava. The beds penetrated belong to the Monongahela formation and give an idea of the alternation of sandstone, shale, and limestone found in that portion of the Pennsylvanian series. The coal at 384½ feet may be the Meigs Creek seam, which is thought to be equivalent to the Sewickley of Pennsylvania.

Record of well No. 1 on Morris Danford's farm, Brookfield Township.

	Feet.
Red clay.....	0 - 18
Red shale.....	18 -100
Gray shale.....	100 -113
Limestone.....	113 -115
Gray shale.....	115 -126
Gray sandstone.....	126 -133
Coal.....	133 -134
Fire clay.....	134 -137
Gray shale.....	137 -152
Gray sandstone.....	152 -209
Blue shale.....	209 -221
Coal.....	221 -223
Fire clay.....	223 -227
Gray shale.....	227 -294
Gray sandstone.....	294 -307
Gray shale.....	307 -320
Gray sandstone.....	320 -384
Coal.....	384 -384½
Fire clay.....	384½ -390

Rig used, diamond drill.

1271. Well near Genoa, Ottawa County.

[Well begun and completed in October, 1905. Authority, E. L. Rugh, of Rugh & Delo, contractors. Samples preserved. Geologic correlations by S. Sanford.]

Oil is found in the Trenton limestone (Ordovician). The overlying formations are, in downward order, Helderberg limestone, Niagara limestone and shale, Clinton limestone, and Medina shale (Silurian); and Cincinnati (gray) and Utica (brown) shales (Ordovician).

Record of well 2 miles north of Genoa.

	Feet.
Helderberg, Niagara, and Clinton:	
Hard gray magnesian limestone.....	25- 210
Soft white limestone.....	210- 390
Hard blue-gray limestone.....	390- 445
Soft gray shale.....	445- 520
Soft light-gray shaly limestone.....	520- 570
Soft gray dolomite.....	570- 600
Medina:	
Soft red shale.....	600- 690
Cincinnati:	
Hard gray shale.....	690- 800
Soft gray shale.....	800-1, 075
Utica:	
Hard dark brownish-gray shale.....	1, 075-1, 299
Trenton:	
Hard brown and gray limestone with light and dark gray shale from 1,314 to 1,325 feet.....	1, 299-1, 351

Rig used, cable. Diameter of casing, 10 inches from 0 to 25 feet; 8 inches from 25 to 520 feet. Well shot with 240 quarts of nitroglycerin. Initial yield of oil, 76 barrels in twenty-four hours; gravity, 34° B.

1281. Well near Helena, Sandusky County.

[Well begun July 13, 1905; completed August 1, 1905. Authority, O. J. Garn, of Imler, Garn & Co., owners. Incomplete set of samples preserved. Geologic correlations by S. Sanford.]

Helena is near the eastern edge of an irregular oil pool that underlies parts of Sandusky, Wood, and Seneca counties. The oil occurs in the Trenton limestone. The overlying formations below the drift are, in downward order, Niagara limestone and shale, Clinton shale, and Medina shale (Silurian); Cincinnati shale and limestone, Utica shale, and Trenton limestone (Ordovician).

Record of well in the SW. $\frac{1}{4}$ NE. $\frac{1}{4}$ sec. 35, Washington Township.

	Feet.
Drift:	
Yellow sand and clay.....	0- 7
Niagara:	
Soft white limestone.....	7- 40
Limestone with blue slate (gray sandstone).....	40- 60
Very hard white (to brownish cherty) limestone.....	60- 90
Hard white (to brownish cherty magnesian) limestone.....	90-130
Gray limestone (brownish, magnesian).....	130-170
Soft, pasty white (and gray magnesian) limestone.....	170-210
Hard light-gray (magnesian) limestone.....	210-220
Hard gray limestone and dark-gray shale.....	220-230
Hard blue limestone (dark-gray limy shale).....	230-250
Hard white limestone (magnesian).....	250-270
Hard blue limestone (light and dark gray).....	270-290

Niagara—Continued.

	Feet.
Hard white limestone (magnesian).....	290-330
Hard blue limestone (gray).....	330-390
"Little break" (gray limy shale), soft and sticky.....	390-415
"Big break" (soft light-greenish shale), hard to drill; cuttings do not mix with water.....	415-460

Clinton:

Hard green limy shale with brownish limestone lentils.....	460-500
Hard, heavy-bedded green shale, slightly limy.....	500- 540

Medina:

Soft dark-red shale.....	540- 560
Soft light-red shale.....	560- 580

Cincinnati:

Soft blue shale (gray, slightly limy).....	580- 600
Soft blue shale (dark brownish and dark gray, slightly limy).....	600- 640
"Second Clinton" (hard gray shaly limestone).....	640- 720
"Second Clinton" (hard gray limy shale).....	720- 740
Soft blue shale (gray, brown, and dark gray, limy).....	740- 880
Soft blue shale (dark greenish, slightly limy).....	880- 940
Soft blue shale (dark gray, slightly limy).....	940- 960
Soft white shale (dark gray and brownish, slightly limy).....	960- 980
Soft white and blue shale (dark gray, slightly limy).....	980-1,000
Soft white shale (dark gray, slightly limy).....	1,000-1,080

Utica:

Soft brown shale (brown and gray, slightly limy).....	1,080-1,320
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Trenton:

• Hard light limestone.....	1,337
Hard light-brown, gray, and dark-gray limestone; oil-bearing strata, 1,337-1,355; salt water, 1,365-1,377 feet.....	1,337-1,377

Rig used, cable. Diameter of well, 10 inches from 0 to 14 feet; 8 inches from 14 to 472 feet; 6 inches from 472 to 1,377 feet. Length of casing, 472 feet. Well yielded 5 barrels of oil, gravity 38° to 40° B., in the first twenty-four hours. From 472 to 1,327 feet hole was so dry that water had to be run in for drilling.

1287. Well east of Akron, Summit County.

[Well begun May 12, 1905; completed July 24, 1905. Authority, James Douglas, contractor. Incomplete set of samples preserved. Geologic correlations by S. Sanford.]

This well, though it found neither oil nor gas in paying quantities, is of interest from its depth, being the deepest reported from Ohio, and also from the great thickness of the salt beds penetrated. The age of these beds is disputed. They have been assigned to the same period as the Cayuga group (Silurian) of New York, but the State geologist was inclined to include them in the Helderberg (latest Silurian). The overlying formations are of Mississippian (lower Carboniferous) and Devonian age and are thus classified: Cuyahoga and Sunbury shales and Berea grit (Mississippian), Onondaga and Helderberg limestones (Devonian and Silurian), Helderberg and Cayuga salt beds (Silurian). The well may also penetrate rocks of the Niagara group (Silurian).

Another well, 1 mile farther west, is said to have struck oil in paying quantities at 2,645 feet.

Record of well 3 miles east of Akron.

Drift:	Feet.
Gravel and quicksand.....	0- 139
Sunbury:	
Slate and limestone shells.....	139- 300

	Feet.
Cuyahoga and Berea:	
Hard gray sandstone.....	300- 385
Bedford and Ohio:	
Slate and shells.....	385- 455
Soft shale.....	455-2, 160
Onondaga and Helderberg:	
Hard white limestone.....	2, 160-2, 800
Helderberg (?) and Cayuga:	
Salt; first stratum.....	2, 800-2, 814
Hard limestone.....	2, 814-2, 830
Salt; second stratum.....	2, 830-2, 870
Hard limestone.....	2, 870-2, 880
Salt; third stratum.....	2, 880-2, 918
Hard limestone.....	2, 918-2, 933
Salt; fourth stratum.....	2, 933-2, 978
Hard limestone.....	2, 978-2, 983
Salt; fifth stratum.....	2, 983-3, 015
Hard limestone.....	3, 015-3, 045
Salt; sixth stratum.....	3, 045-3, 085
Hard limestone.....	3, 085-3, 090
Salt; seventh stratum.....	3, 090-3, 130
Hard limestone.....	3, 130-3, 155
Salt; eighth stratum.....	3, 155-3, 185
Hard limestone.....	3, 185-3, 195
Salt; ninth stratum, bottom of salt.....	3, 195-3, 220
Hard limestone.....	3, 220-3, 240
Soft shale.....	3, 240-3, 280
Niagara (?):	
Hard limestone.....	3, 280-3, 480
Hard limestone—little oil, gas, and water.....	3, 480-3, 500
Hard white sandstone.....	3, 500-3, 505
Hard limestone.....	3, 505-3, 749
Soft slate.....	3, 749-3, 789

Diameter of casing, 10 inches from top to 139 feet; 8½ inches from 139 to 455 feet. Diameter of well below casing, 8½ inches from 455 to 3,310 feet; 6½ inches from 3,310 to 3,789 feet. No oil nor gas found.

1290. Well at Zoar, Tuscarawas County.

[Well begun August 2, 1905; completed August 19, 1905. Authority, H. H. McKinney, driller. No samples. Geologic correlations by S. Sanford.]

This record, though the well produced neither oil nor gas, is of interest, as no logs of wells in Lawrence Township have been published. The State Survey has noted that a number of wells have been put down there, but the records were not placed at its disposal. The formations penetrated belong to the Pennsylvanian or Coal Measures and Mississippian series of the Carboniferous system. The formations, in descending order, are Allegheny limestone and shale, Pottsville (including Salt sand), Logan group (including Big Injun) and Berea grit.

Record of well No. 1 on John Bimeler farm, 800 feet east of Zoar post-office.

	Feet.
Surface soil.....	0- 7
Allegheny:	
Yellow shale.....	7- 20
Blue limestone; water bearing.....	20- 25
Soft black shale.....	25- 40
Hard blue limestone.....	40- 45
Soft black shale.....	45-160

Pottsville:	Feet.
Soft sandstone, salt sand	160-200
Logan:	
Black shale.....	200-230
Sandstone, Big Injun.....	230-344
Cuyahoga and Sunbury:	
Black shale.....	344-430
Shale with alternate layers of sandstone; formation is nearly all shale.....	430-735
Berea:	
Sandstone, Berea grit.....	753-795
Rig used, cable. Casing used, 8-inch to 430 feet; 6½-inch from 430 to 790 feet. A smell of oil and a little show of gas at 775 feet. A large amount of salt water at 790 feet.	

1297. Well at Creston, Wayne County.

[Well begun in April, 1905; completed in June, 1905. Authority, R. Lambie, contractor and driller. Samples preserved. Geologic correlations by S. Sanford.]

This log is fairly typical of some shallow wells in Wayne County developing the oil and gas found in the Berea grit, a sandstone of remarkably constant character that underlies about 15,000 square miles of the State. It occurs in the Mississippian series of the Carboniferous below the Big Injun formation. It is underlain by the Bedford red shale (Devonian) and overlain by the Sunbury and Cuyahoga shales. The record shows that the Berea at this well is very thin.

Record of well No. 1 on Martin Cole farm, one-half mile north of Creston.

Drift:	Feet.
Dark sandy loam.....	0- 1
Soft reddish clay with sand and gravel.....	1- 20
Soft gray sand; water-bearing.....	20- 30
Very soft gray limy clay.....	30-100
Soft gray sand; water-bearing.....	100-163
Soft gray limy clay.....	163-179
Soft dark clay, sand, and gravel.....	179-246
Cuyahoga and Sunbury:	
Soft light and dark gray shale; contains a little water.....	246-440
Berea:	
Coarse light-gray sandstone; gas-bearing, pressure 20 pounds per square inch;	
Berea grit.....	440-441
Soft dark-gray shale.....	441-443
Bedford:	
Soft red shale.....	443-493
Soft gray and reddish shale.....	493-512
Rig used, cable. Diameter of well, 8 and 6 inches. Length of casing (4½-inch), 280 feet; of drive pipe, 256 feet.	

OKLAHOMA.

1318. Well near Cleveland, Pawnee County.

[Well begun and completed in 1905. Authority, J. L. Apple, of Apple, Elyea & Co., owners. No samples.]

This record shows formations underlying the pay horizon of the Cleveland oil pool for nearly 900 feet. The rocks are of Pennsylvanian age. The rocks outcropping for 25 miles west and east and 40 miles north have been grouped together as the Hominy formation (Pennsylvanian), including the Pottawatomie, Douglas, Shawnee, Wabaunsee, Cottonwood, and Neosho formations of the Kansas geologists, and have a thickness of over 1,500 feet. The depth to Mississippian rocks at Cleveland is unknown, but may be 10,000 feet.

The geology of Oklahoma is discussed in Water-Supply and Irrigation Paper No. 148, "Geology and water resources of Oklahoma," by C. N. Gould.

Record of well on C. D. Law farm in the northeast corner of sec. 15, T. 22, R. 7.

	Feet.
River sand.....	0- 32
Slate and sand in alternating beds, with water at 142-182 feet and salt water at 420-440 feet.....	32- 775
Limestone.....	775- 780
Slate, sand, and slate; at 1,070 feet hole filled up 890 feet with salt water ..	780-1, 350
Limestone, shells, and slate.....	1, 350-1, 500
Sand; enough water to drill; thought to be Cleveland gas sand.....	1, 500-1, 520
Slate; Cleveland oil sand should be near 1,650 feet.....	1, 520-1, 870
Sand; 3 bailers of water.....	1, 870-1, 900
Black shale.....	1, 900-1, 985
Hard limestone.....	1, 985-2, 085
Black shale.....	2, 085-2, 110
Limestone.....	2, 110-2, 155
Shale.....	2, 155-2, 175
Hard shell.....	2, 175-2, 178
Shale.....	2, 178-2, 190
Sand, thought to be horizon of Bartlesville oil; showing of gas and oil at 2,210 feet; shale break at 2,220-2,235 feet.....	2, 190-2, 250
Shale.....	2, 250-2, 410
Limestone.....	2, 410-2, 420
Shale.....	2, 420-2, 450

Casing used, 350 feet of 10-inch; 800 feet of 8 $\frac{1}{4}$ -inch; 1,350 feet of 6 $\frac{3}{8}$ -inch. At 2,450 feet the cable broke, dropping the tools and 2,300 feet of rope; the hole caved over the tools and was abandoned.

PENNSYLVANIA.

1336. Well in Parks Township, Armstrong County.

[Well completed in 1905. Authority, F. H. Oliphant. No samples. Geologic correlations by Charles Butts.]

This skeleton log of a well in Armstrong County is given because of its depth. The drill passed through rocks of Carboniferous and Devonian age, which are included in the Allegheny and Pottsville (Pennsylvanian) and Mauch Chunk and Pocono (Mississippian) of the Carboniferous system and the Catskill and Chemung of the Devonian.

The geology of a large part of Armstrong County and the occurrence of the various oil and gas sands are described in the Kittanning folio (No. 115) and the Rural Valley folio (No. 125) of the Geologic Atlas of the United States.

Record of well No. 323 on G. W. Parker farm, Parks Township.

	Feet.
Casing, 6 $\frac{1}{4}$ -inch.....	525
Gas sand.....	670- 680
Second sand.....	800- 820
Hundred-foot sand.....	820- 870
Thirty-foot sand (Fifty-foot).....	880- 900
Blue Monday.....	915- 925
Boulder.....	970-1, 000
Stray sand.....	1, 040-1, 070
Third sand; oil at 1,101 feet.....	1, 095-1, 115
Fifth sand.....	1, 165-1, 170
Black sand.....	1, 795-1, 825
Dark sand.....	1, 900-1, 920
Speechley sand, 1,971-2,007 feet; lower Speechley, 2,015-2,035 feet; gas at 2,018 feet.....	1, 971-2, 035

	Feet.
Sand, poor.....	2, 145-2, 230
Sand, poor.....	2, 590-2, 650
Slate and shells.....	2, 650-2, 812

Well was plugged and filled in from 2,812 to 2,102 feet. Gas at 2,018 feet flowed naturally 50,000 cubic feet per day and 130,000 cubic feet twenty-four hours after well was shot.

1345. Well near Waynesburg, Greene County.

[Well completed in March, 1895. Authority, F. H. Oliphant. No samples. Geologic correlations by R. W. Stone.]

This deep well shows the formations underlying the Pittsburg coal for nearly 2,600 feet. The rocks are of Carboniferous—including Permian, Pennsylvanian, and Mississippian—and Devonian age. The formations represented are Washington (Permian); Monongahela, Conemaugh, Allegheny, and Pottsville (Pennsylvanian); and Mauch Chunk and Pocono, or Big Injun (Mississippian). Below the Pocono are sandstones and shales of Devonian age which have not been given formation names, though certain sandstones are recognized by drillers and have been named.

The geology of the region near Waynesburg is discussed in the Waynesburg folio (No. 121) of the Geologic Atlas of the United States.

Record of well No. 1 on H. M. Spragg farm, 6 miles south of Waynesburg.

	Feet.
Washington:	
Sandstone.....	235- 290
Monongahela:	
Bluff coal (Waynesburg).....	290- 295
Black shale.....	295- 360
Limestone.....	360- 410
White shale.....	410- 465
Gray sandstone.....	465- 510
Black shale.....	510- 550
Mapletown coal (or Sewickley).....	550- 555
Black shale.....	555- 580
Limestone.....	580- 630
Pittsburg coal.....	630- 635
Conemaugh:	
Black shale.....	635- 670
Limestone.....	670- 705
White sandstone.....	705- 910
Red rock.....	910- 935
Black shale.....	935- 940
Red rock.....	940- 995
Limestone.....	995-1, 035
Sandstone, Little Dunkard.....	1, 035-1, 055
White shale.....	1, 055-1, 075
Limestone.....	1, 075-1, 130
Sandstone, Big Dunkard.....	1, 130-1, 200
Red rock.....	1, 200-1, 255
Allegheny:	
Black shale.....	1, 255-1, 270
White sandstone.....	1, 270-1, 295
Black shale.....	1, 295-1, 330
Limestone.....	1, 330-1, 355
White shale.....	1, 355-1, 390
Red rock.....	1, 390-1, 425
Gray sandstone.....	1, 425-1, 455
Limestone.....	1, 455-1, 495

Pottsville.	Feet.
Gas sand	1, 495-1, 525
Limestone	1, 525-1, 545
White shale	1, 545-1, 580
Salt sand	1, 580-1, 690
Mauch Chunk:	
Red rock	1, 690-1, 705
Black shale	1, 705-1, 710
Red rock	1, 710-1, 725
White shale	1, 725-1, 780
Limestone; shale break at 1,810 feet	1, 780-1, 815
Black shale	1, 815-1, 825
Little Lime	1, 825-1, 840
Pencil Cave	1, 840-1, 845
Big Lime	1, 845-1, 895
Pocono:	
Big Injun; showing of gas at 2,115 and 2,130 feet	1, 895-2, 150
White shale	2, 150-2, 170
Limestone	2, 170-2, 185
Squaw sand	2, 185-2, 225
White shale	2, 225-2, 245
Pocono or Catskill (?):	
Limestone	2, 245-2, 260
White sandstone	2, 260-2, 290
Limestone	2, 290-2, 310
Black shale	2, 310-2, 340
Dark sandstone	2, 340-2, 370
Black sandstone	2, 370-2, 385
Limestone	2, 385-2, 390
Berea sand (?)	2, 390-2, 425
Limestone	2, 425-2, 435
Black shale	2, 435-2, 445
Limestone	2, 445-2, 490
White sandstone	2, 490-2, 505
White shale	2, 505-2, 520
Limestone	2, 520-2, 535
White shale	2, 535-2, 545
Gantz sand	2, 545-2, 575
Black shale	2, 575-2, 585
Fifty-foot sand	2, 585-2, 620
Black shale	2, 620-2, 655
Limestone	2, 655-2, 670
Red rock	2, 670-2, 680
White sandstone, Thirty-foot sand	2, 680-2, 700
Catskill:	
White shale	2, 700-2, 715
Dark gray sandstone	2, 715-2, 745
Limestone	2, 745-2, 785
Red rock	2, 785-2, 810
Sandstone, Stray sand	2, 810-2, 825
Black shale	2, 825-2, 840
Sandstone, Gordon sand	2, 840-2, 855
Black shale	2, 855-2, 865
Limestone	2, 865-2, 870

Catskill--Continued.

	Feet.
White shale.....	2, 870-2, 875
Dark sandstone, Flat Run sand.....	2, 875-2, 885
White shale.....	2, 885-2, 895
Limestone.....	2, 895-2, 905
Red rock.....	2, 905-2, 915
Sandstone, Fourth sand.....	2, 915-2, 920
White shale.....	2, 920-2, 935
Sandstone, Fifth sand.....	2, 935-2, 945
Shale.....	2, 945-2, 955
Limestone.....	2, 955-2, 960
Red rock.....	2, 960-2, 970

Chemung:

Hard dark sandstone.....	2, 970-2, 985
White shale.....	2, 985-3, 000
Limestone.....	3, 000-3, 010
White shale.....	3, 010-3, 025
Dark sandstone.....	3, 025-3, 035
Black shale.....	3, 035-3, 045
Limestone.....	3, 045-3, 060
Black shale.....	3, 060-3, 090
Limestone.....	3, 090-3, 105
White sandstone, "Bayard".....	3, 105-3, 120
White shale.....	3, 120-3, 165
Limestone.....	3, 165-3, 180
Hard black sandstone.....	3, 180-3, 190
White shale.....	3, 190-3, 215½

Dry hole.

1350. Well at Slate Run, Lycoming County.

[Well begun April 11, 1905; drilling stopped May 11, resumed August 30; well completed September 25, 1905. Authority, W. E. Sandborn, superintendent Tidewater Pipe Company, owner. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by R. W. Stone.]

This deep well gives a section in the Blossburg syncline, a broad fold the axis of which passes west of the well. The formations penetrated are of Devonian age and include the lower part of the Catskill-Pocono group (the Cattaraugus formation of Tioga County to the northwest) and part of the Chemung formation. The Cattaraugus formation is characterized by red shale and red, brown, and gray sandstones and the Chemung by gray or greenish shales and sandstones. The character of these rocks in Tioga County is described in the Elkland-Tioga folio (No. 93) of the Geologic Atlas of the United States.

Record of well No. 1 on J. B. Tomb farm.

Cattaraugus:

	Feet.
Hard gray sandy shale; much fresh water.....	50- 106
Hard brownish-red sandy and limy shale.....	106- 146
Hard red and brown sandstone with limy layers.....	146- 161
Hard gray sandy and limy shale.....	161- 166
Hard red limy, shaly sandstone; large pieces of "red rock" and pebbles at 181 feet.....	166- 186
Hard fine drab limy sandstone.....	186- 209
Hard fine brownish-red sandstone.....	209- 229
Hard reddish-gray shaly sandstone to 240 feet, brownish-red below.....	229- 250
Hard red sandy shale to 270 feet, reddish-gray below.....	250- 290
Hard fine gray sandstone.....	290- 310
Hard reddish-gray shaly sandstone to 332 feet, red below.....	310- 350

Cattaraugus—Continued.

Feet.

Hard red sandy shale	350- 356
Hard reddish-brown shaly sandstone	356- 373
Very hard gray sandstone	373- 396
Very hard red sandy shale or fine argillaceous sandstone	396- 412
Hard rock (no sample)	412- 438
Hard red and gray shaly sandstone; little salt water at 476 feet	438- 476
Hard reddish-gray limy sandstone	476- 500
Hard reddish limy sandstone to 524 feet, gray to 548 and reddish-brown to 560 feet; little salt water at 506 feet; flood of it at 560 feet	500- 560
Hard fine red and reddish-brown sandstone	560- 569
Medium hard reddish-gray limy sandstone	569- 580
Hard red and gray limy, sandy shale to 602 feet, gray below; hole caved at 601 feet	580- 620
Chemung:	
Hard dark-gray shale and gray limestone	620- 640
Hard gray shaly limestone	640- 660
Hard dark-gray limy shale; from 670 to 680 feet very hard drilling; some salt-sulphur water	660- 680
Gray sandy and limy shale to 774 feet, dark gray below	680- 794
Hard gray shaly limestone	794- 812
Hard dark-gray sandy shale and light-gray shaly limestone	812- 824
Hard gray sandy and limy shale	824- 862
Hard gray limy grit; little gas at 862 feet	862- 868
Soft gray sandy and limy shale	868- 870
Hard dark-gray sandy shale and light-gray sandy limestone	870- 875
Hard gray sandy shale	875- 887
Hard gray sandy limestone	887- 898
Hard gray sandy shale, with limy layers	898- 986
Hard dark-gray sandy shale, gray and limy below 1,004 feet	986-1,028
Hard gray grit, limy below 1,034 feet	1,028-1,040
Hard gray sandy shale, with limy layers	1,040-1,070
Hard gray limy grit and sandy magnesian limestone; some gas at 1,086 feet	1,070-1,140
Hard light-gray limestone and gray limy grit, softer below 1,142 feet; good gas at 1,142 feet	1,140-1,148
Dark-gray limy shale from 1,148 to 1,153 feet; very hard limy sandstone below; struck salt water; well plugged up to 1,153 feet; gas from between 1,142 and 1,153 feet gave 130,000 cubic feet in twenty-four hours; rock pressure of gas in 1,142-foot sand was 910 pounds per square inch; when this gas was exhausted drilling was resumed	1,148-1,155½
Fine gray argillaceous sandstone or sandy shale	1,155-1,210
Light-gray limy sandstone and dark-gray sandy shale	1,210-1,240
Soft, fine gray limy, argillaceous sandstone	1,240-1,265
Soft gray shale	1,265-1,276
Soft gray sandy and limy shale and limy sandstone	1,276-1,335
Hard gray slate (sandy shale with limy streaks)	1,335-1,380
Gray shelly slate (gray sandy shale)	1,380-1,455
Soft gray slate with hard shells (gray limy and sandy shale)	1,455-1,500
Hard slate and sand (sample like preceding)	1,500-1,522
Soft gray slate (slightly limy and sandy shale) with hard layers at 1,664 to 1,706 feet	1,522-1,745
Gray sand and slate (dark-gray limy and sandy shale)	1,745-1,756

Chemung—Continued.

	Feet.
Soft gray slaty sand (slightly sandy and limy shale).....	1, 756-1, 858
Hard dark-gray argillaceous sandstone and light-gray sandstone to 1,860 feet; hard dark-gray limy, sandy shale to 1,870 feet; limy, sandy shale and shaly sandstone below.....	1, 858-1, 878
Gray slate and sand (varying proportions of sand, rocks ranging from soft, slightly sandy shale to hard, fine sandstone).....	1, 878-1, 953
Gray slate (gray sandy shale, slightly limy).....	1, 953-2, 000
Fine, hard slate (fine, slightly limy, argillaceous sandstone).....	2, 000-2, 045
Hard gray slate (gray sandy shale, slightly limy).....	2, 045-2, 128
Soft gray slate (shale much like preceding).....	2, 128-2, 198
Gray limy, argillaceous sandstone.....	2, 198-2, 280
Gray sandy shale, more or less limy.....	2, 280-2, 335
Fine dark-greenish, slightly limy, micaceous sandstone.....	2, 335-2, 352
Gray sandy and limy rocks, hardness varying with proportion of sand; sandy shales and argillaceous sandstones.....	2, 352-2, 503

Rig used, cable. Casing used, 601 feet of 6 $\frac{1}{4}$ -inch. Hole was filled with fresh water from 40 to about 350 feet.

1355. Well near Pocahontas, Somerset County.

[Well completed in 1905. Authority, P. E. Finzel, general manager Piney Run Oil and Gas Company, owner. Samples to 1,174 feet preserved. Log compiled from samples by S. Sanford.]

This is one of the deepest wells drilled in southern Somerset County of which the Survey has record. The well is on the axis of the Deer Park anticline, about midway between Great Savage and Meadow mountains. Apparently the first formation penetrated is the Jennings. This formation in Garrett County, Md., is 3,000 to 5,000 feet thick and is composed of shales, sandy shales, and sandstones. It contains beds corresponding in age to the Chemung, Nunda, and Genesee epochs of the Devonian period. Below it is the Romney formation, also Devonian, 1,600 feet thick, of sandstone and shale.

Record of well in Greenville Township, 1 mile north of Pocahontas.

	Feet.
Dark-gray sandy shale and light-gray limestone.....	45- 85
Light-gray sandstone and dark-gray sandy shale.....	85- 125
Dark-gray sandstone.....	125- 140
No sample.....	140- 175
Dark-gray sandy shale.....	175- 180
No sample.....	180- 200
Brownish limestone and dark-gray sandy shale.....	200- 275
Dark-gray sandy shale and limy sandstone.....	275- 300
Dark-gray, slightly limy, sandy shale.....	300- 325
Dark-gray sandy shale and light-gray limestone.....	325- 535
Dark-gray sandy shale and limy sandstone.....	535- 775
Dark-gray sandy shale.....	775- 800
Light-gray and brown sandstone.....	800- 950
Gray limy sandstone.....	950- 960
Light-gray sandstone and dark-gray sandy shale.....	960- 980
Dark-gray sandy shale and light-gray and brown sandstone.....	980-1, 025
Light and dark gray sandy shale and brown sandstone.....	1, 025-1, 105
Fine gray and brown sandstone.....	1, 105-1, 115
Gray sandstone.....	1, 115-1, 174
Slate and limestone.....	1, 174-1, 400
Chocolate-colored sand; showing of oil.....	1, 400-1, 450

	Feet.
Slate.....	1, 450-1, 500
Sand.....	1, 500-1, 585
Slate and limestone.....	1, 585-2, 500

Elevation of well, about 2,200 feet. Casing used, 300 feet of 8 $\frac{1}{4}$ -inch; 600 feet of 6 $\frac{1}{4}$ -inch; 1,600 feet of 5 $\frac{1}{2}$ -inch. Principal water bed was in gravel at 40 feet. Well abandoned and plugged at 2,500 feet.

1369. Well near Grand Valley, Warren County.

[Well completed February 29, 1888. Authority, J. G. Winger. Incomplete series of samples preserved.]

This is a record of one of the deepest wells put down in the Grand Valley oil field and is of interest as showing the character of the rocks underlying the Third sand, in which most wells in the field stopped. The rocks, including the three oil sands, have been called the "Venango oil group." They belong to the Catskill-Pocono group and their exact age, whether Carboniferous or Devonian, is more or less in doubt.

Record of well No. 1 on Zane farm, lot No. 147, Eldred Township.

	Feet.
Sort yellow clay.....	0- 20
Hard gray and black shale and sand.....	20- 262
Soft, generally black sandy shale.....	262- 411
Soft gray sandstone, Second sand; show of oil and very small show of gas and salt water.....	411- 459
Black and blue soft shale.....	459- 642
Hard red sand, upper part of Third sand; oil and gas are frequently found in this bed near Grand Valley.....	642- 646
Gray sand; hard and contained gas from 646 to 649 feet; soft and slight show of oil below, bottom of Third sand.....	646- 655
Hard black shale.....	655- 765
Soft red and brown shale.....	765- 965
Hard gray and black sand.....	965-1, 340
Hard black shale.....	1, 340-1, 368

Rig used, standard. Casing used, 262 feet of 5 $\frac{1}{2}$ -inch. Fresh water from 50 to 200 feet. Initial yield of gas, 60,000 feet; rock pressure, 30 pounds per square inch.

1371. Well near Grand Valley, Warren County.

[Well begun September 29, 1905; completed October 13, 1905. Authority, Josiah G. Winger, contractor. Samples preserved.]

This carefully kept log of a well in the Grand Valley field mentions an unusual feature, a fall of water from 80 to 160 feet. The well, though shallow, shows the character of the Second and Third sands of the "Venango oil group" at this point. The rocks are included in the Catskill-Pocono group and are of Carboniferous or Devonian age.

Record of Dunderdale well No. 18 in borough of Grand Valley.

	Feet.
Soft yellow clay.....	0 - 15
Soft bluish shale.....	15 - 70
Hard, fine gray sandstone, First or Mountain sand; fresh water at 80 feet rushes into hole and falls to 160 feet, the water level.....	70 - 89
Hard gray shale.....	89 -310
Hard, fine gray sandstone, first member of Second sand.....	310 -320
Soft gray muddy shale, second member of Second sand.....	320 -340
Hard gray sandstone, third member of Second sand.....	340 -350

	Feet.
Soft black muddy shale, top of Third sand at 547 feet.....	350 -547
Hard, coarse brownish sandstone, with pebbles, first 2 feet of Third sand.....	547 -549
Hard light-gray sandstone and dark-gray shaly sandstone, second 2 feet of Third sand.....	549 -551
Soft, coarse white or brownish sandstone, the pay sand; free flow of oil and gas; this probably overlain by a 1-inch stratum of black shale.....	551 -554
Soft white porous sandstone, pay sand, bottom of pay at 557 feet.....	554 -557
Hard, fine white sandstone—salt water; while drilling this 3 feet oil and water rose in the hole to a height of 100 feet; probably all salt water produced is from this horizon.....	557 -560
Hard grayish-white sandstone, called "Salt sand;" may contain salt water...	560 -570½
Soft brownish-gray sandstone, bottom of Salt sand at 575 feet.....	570½ -575
Soft dark pebbly sandstone and shale, much "broken up" and not regarded by Mr. Winger as a solid sand.....	575 -579
Soft dark-gray shale and light-gray sandstone and conglomerate.....	579 -583
Hard shale, conglomerate, and sand (sample like preceding).....	583 -588½
Soft light-gray sandstone and dark-gray shale and sandstone, bottom of Third sand at 598 feet; sand 51 feet thick.....	588½ -598
Soft black shale.....	598 -609½

Rig used, standard. Diameter of well, 16 inches to 15 feet; 8 inches from 15 to 257½ feet; length of casing, 257½ feet. Well shot at 551 feet with 40 quarts of nitroglycerin. Yield first twenty-four hours, 11½ barrels, 45° oil; initial pressure of gas estimated at 60 pounds.

1398. Well near Warren, Warren County.

[Well completed in 1905. Authority, F. B. Jackson, owner. Samples preserved. Log compiled from samples by S. Sanford.]

This is the second deepest well drilled in northern Pennsylvania of which the Survey has a record. The formations penetrated are probably all of Devonian age. The drill passed through the Catskill formation and through the Chemung, Nunda (Portage), Genesee (?), Hamilton, and Marcellus formations (Devonian), if the limestones encountered below 3,395 feet correspond to the Onondaga, of New York. The only other well in the oil fields of northern Pennsylvania to reach the Onondaga is the Conway well, 3,880 feet deep, in Venango County. In the report of the Second Geological Survey of Pennsylvania, Vol. I4, Mr. John F. Carll indicated that the Onondaga might be found under Warren at a depth of about 3,000 feet. The oil-bearing sands found in the wells at Warren underlie, at an interval of about 300 feet, the sands of the "Venango oil group," which contain oil at Grand Valley and elsewhere in the southwestern part of Warren County. Owing to the lack of good evidence, no attempt is made to correlate the sandstones penetrated by this well with those reported from the productive wells at Warren and North Warren. The well started apparently in the "Venango oil group."

Record of well on Greene farm, 3 miles west of Warren.

	Feet.
Sand and gravel.....	0- 100
Dark-gray sandy shale and light-gray argillaceous sandstone, slightly limy..	100- 200
Dark-greenish argillaceous sandstone and reddish sandy shale.....	200- 300
Dark shaly, argillaceous sandstone and gray limy sandstone.....	300- 400
Dark shaly, argillaceous sandstone.....	400- 547
Dark gray shaly sandstone, slightly limy.....	547- 592
Gray sandstone and dark sandy shale.....	592- 614
Coarse gray sandstone and dark sandy shale.....	614- 640
Gray and greenish sandstone, slightly limy.....	640- 900

	Feet.
Gray and greenish limy sandstone, dark argillaceous sandstone, and sandy shale.....	900-1, 230
Gray limy sandstone and dark shale.....	1, 230-1, 325
Gray and greenish limy sandstone and dark sandy shale.....	1, 325-1, 650
Dark sandy shale and shaly sandstone and gray sandstone, the latter limy below 2,025 feet.....	1, 650-2, 050
Black sandy shale and gray argillaceous sandstone.....	2, 050-2, 175
Gray limy sandstone, dark shaly sandstone, and dark sandy shale.....	2, 175-2, 200
Gray sandstone and dark sandy shale.....	2, 200-2, 300
Dark-gray and black sandy shale and gray limy sandstone.....	2, 300-2, 336
Dark-gray and greenish shaly sandstone and sandy shale and gray limy sandstone.....	2, 336-2, 550
Dark gray to black sandy shale.....	2, 550-2, 750
Gray sandstone and shaly sandstone and dark-gray sandy shale.....	2, 750-2, 850
Black, dark-gray, and gray sandy shale.....	2, 850-3, 120
Dark-gray and gray sandy shale and shaly sandstone.....	3, 120-3, 217
Dark-gray to black sandy shale.....	3, 229-3, 277
Gray and dark-gray sandy shale and shaly, limy sandstone.....	3, 277-3, 332
Dark-gray to black sandy shale.....	3, 332-3, 390
Dark-gray to black shale and brownish limestone.....	3, 390-3, 398
Brownish magnesian limestone and dark shale.....	3, 398-3, 430
Dark-gray and black sandy and limy shale.....	3, 430-3, 520
Black shale.....	3, 520-3, 660
Black shale with light limestone.....	3, 660-3, 670

Diameter of well, 7½ inches. Casing used, 406 feet of 8-inch. Well perfectly dry, no water being encountered.

1416a. Well near Thomas, Washington County.

[Well begun November 20, 1905; completed December 31, 1905. Authority, S. D. McCloy, of Lyle & McCloy, contractors. Samples preserved. Log compiled from samples by S. Sanford. Geologic correlations by R. W. Stone.]

This log shows in a general way the character of the formations overlying the "Fifty-foot" sand in the Speer oil pool in Washington County. The formations are of Carboniferous age, including parts of the Pennsylvanian and Mississippian series. They are, in descending order, Monongahela, Conemaugh, Allegheny, and Pottsville (Pennsylvanian); and Mauch Chunk and Pocono (Mississippian). The approximate limits of these formations are indicated.

Record of well No. 1 on John R. McMurray farm, 1¼ miles north of Thomas.

Soil.....	Feet.
	0- 12
Monongahela:	
Soft dark-gray and brownish limestone.....	12- 50
Soft, coarse gray micaceous sandstone; water at 65 feet.....	50- 100
Hard brown limestone and coarse gray micaceous sandstone.....	100- 150
Soft, coarse gray sandstone.....	150- 200
Hard brownish-gray limestone.....	200- 250
Soft dark gray and black shale.....	250- 300
Soft dark-gray and greenish, slightly limy shale.....	300- 350
Soft black sandy shale.....	350- 395
Coal (Pittsburg); water.....	395- 402

	Feet.
Conemaugh:	
Gray and brown limestone and dark sandy shale; bottomed 10-inch casing at 412 feet.....	402- 450
Soft light and dark gray sandy shale.....	450- 500
Soft red shale and green limy sandstone.....	500- 550
Hard gray, slightly limy sandstone.....	550- 600
Soft greenish-gray shale, darker below 650 feet.....	600- 700
Hard, fine dark-greenish sandstone, with brownish limestone.....	700- 750
Conemaugh and Allegheny:	
Soft light-greenish and dark-gray or brownish shale; bottomed 8-inch casing at 775 feet.....	750- 800
Hard brown and gray sandy shale.....	800- 850
Soft dark slate (no sample).....	850- 900
Soft dark gray sandy shale with limy streaks.....	900- 950
Hard gray sandstone with limy streaks.....	950-1,000
Soft light shaly, argillaceous sandstone.....	1,000-1,050
Hard, fine greenish limy sandstone and brown limestone.....	1,050-1,100
Gray, greenish, and brownish sandstone with sandy shale.....	1,100-1,150
Soft gray sandstone and black sandy shale.....	1,150-1,200
Pottsville:	
Soft dark shaly, micaceous sandstone.....	1,200-1,250
Hard, coarse light and dark gray and brownish sandstone, slightly limy.....	1,250-1,350
Mauch Chunk:	
Soft dark-gray sandy shale and greenish and brownish shale.....	1,350-1,400
Soft black sandy shale.....	1,400-1,450
Gray and brownish shale and brownish limestone, Greenbrier limestone.....	1,450-1,500
Pocono:	
Gray sandstone and black argillaceous sandstone and sandy shale.....	1,500-1,550
Hard white, light-gray, and brownish sandstone, upper portion limy ...	1,550-1,750
Hard, coarse gray sandstone and dark-gray sandy shale.....	1,750-1,800
Hard gray sandstone, dark-gray micaceous, shaly sandstone, and sandy shale.....	1,800-1,850
Hard, medium brown and greenish sandstone, slightly limy, and dark sandy shale.....	1,850-1,900
Soft dark argillaceous sandstone and sandy shale.....	1,900-2,000
Gray and dark-gray micaceous sandstone, with shaly streaks; hard to 2,050 feet; soft and somewhat limy below.....	2,000-2,100
Pocono or Catskill (?):	
Hard gray sandstone and dark-gray shaly sandstone.....	2,100-2,150
Hard gray, greenish, and brownish sandstone and dark-gray shaly sandstone.....	2,150-2,200
Gray sandstone, dark-gray shaly sandstone, and sandy shale.....	2,200-2,250
Hard gray sandstone and dark-gray argillaceous sandstone.....	2,250-2,310
Soft, coarse light-gray sandstone and fine dark-gray sandstone.....	2,310-2,342

Rig used, cable. Diameter of well at mouth, 13 inches; at bottom, 6½ inches. Casing used, 412 feet of 10-inch; 700 feet of 8-inch; 1,570 feet of 6½-inch.

SOUTH CAROLINA.

1420. Well at Aiken, Aiken County.

[Well begun and completed in 1905. Authority, Perry Andrews, contractor and driller. Samples preserved to 560 feet. Log compiled from samples by S. Sanford. Geologic correlations by W. B. Clark.]

Aiken is near the western edge of the Atlantic Coastal Plain, and the Coastal Plain deposits are consequently comparatively thin there. This well goes through them and into the underlying granite or gneiss. The sedimentary beds penetrated belong to the Lafayette (Pliocene) and Potomac (early Cretaceous) formations.

Record of well of Carolina Light and Power Company at Aiken.

Lafayette:	Fect.
Bright-red clayey sand.....	20
Pale-red clayey sand.....	40
Potomac:	
Fine buff sand and clay, not sticky.....	60
Yellow and buff clayey sand.....	80
Pure-white clay, kaolin.....	100
Light-buff clay and sand.....	120
Coarse sand with brownish or yellowish clay.....	140-280
Brownish arkosic sandstone.....	300
Pure-white and light-purple clay.....	320-380
Coarse sand cemented by iron oxide.....	400
White to brownish arkosic sand and gravel.....	420
Sand and gravel with brownish clay.....	440
Algonkian (?):	
Coarse granite or gneiss.....	460-560

Rig used, cable. Depth of well, 1,000 feet. No water of moment found; maximum yield of well, 25 gallons per hour.

1425. Well near Otranto, Barnwell County.

[Well begun August 6, 1905; completed in 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Incomplete series of samples preserved. Geologic correlations by W. B. Clark.]

The formations penetrated by this well below 20 feet are of Eocene (Tertiary) and late Cretaceous age.

Record of well 2 miles north of Otranto.

Eocene:	Fect.
Tough light marl (gray limy clay or soft clayey limestone).....	20 -140
Phosphate rock (hard black and gray nodules, may be phosphatic).....	140 -142
Shell rock (white to brownish limestone with chert and possibly apatite)...	142 -290
Eocene or Cretaceous (?):	
Gray sand.....	290 -300
Rock (gray, more or less silicified limestone with sand).....	300 -310
Medium-fine gray sand.....	310 -317
Hard rock (gray, more or less silicified limestone, containing dark nodules).	317 -327
Shell rock (limestone like preceding with dark shaly layers).....	327 -337
Cretaceous:	
Dark tough marl (limy clay and sand with glauconite).....	337 -380
Tough dark sandy marl (olive-gray sand and clay, containing a few bits of fossil shells).....	380 -400
Tough dark marl (no sample).....	400 -498½
Hard rock (no sample).....	498½ -500
Tough dark marl (no sample).....	500 -600

Cretaceous—Continued.

	Feet.
Hard rock (no sample).....	600-605
Soft sandy marl (fine, olive-gray, slightly limy sand).....	605-650
Tough dark marl (no sample).....	650-830
Soft sandy marl (no sample).....	830-850
Hard rock (no sample).....	850-855
Sand and shell (coarse gray sand, limestone, and bits of fossil shells).....	855-870
Dark and light sand (medium-fine gray, slightly limy sand, containing glauconite).....	870-890
Light-gray sand (coarser than preceding, containing glauconite).....	890-918

Rig used, rotary. Casing used, 140 feet of 4-inch; 340 feet of 3-inch; 870 feet of 2-inch. Length of strainer, 20 feet. Principal water bed from 870 to 918 feet. Elevation of well mouth, about 50 feet above sea level. Static head of water, +9 feet.

1426. Well at Fort Moultrie, Charleston County.

[Well completed in 1905. Authority, Capt. F. W. Cole, constructing quartermaster. No samples. Geologic correlations by W. B. Clark.]

This is one of the very deep wells to obtain good water from sedimentary formations underlying the Atlantic Coastal Plain. It is thought that the water-bearing sands developed belong to the Potomac formation (early Cretaceous) and that the great mass of "marl," sand, and sandstone above 1,820 feet is of late (marine) Cretaceous age. Beds of Tertiary age may occur down to a depth of over 500 feet. The samples saved were mostly mud which stuck to the drill, and the drillers' use of terms is probably not accurate. Exact identification of horizons and the grouping of strata are impossible, owing to the present imperfect knowledge regarding the deep-lying formations of the South Carolina coast. The log is given because of the depth of the well and the supply of water obtained, and also because it shows the general character of the beds overlying the water-bearing formations.

Record of well at Fort Moultrie.

Recent:	Feet.
Sea sand	0 - 7
Tertiary (?):	
Clay and marl.....	7 - 91
Marl with layers of cemented shells 1 to 8 feet thick.....	91 - 348
Hard sandstone.....	348 - 355
Marl with shells.....	355 - 371
Soft sandstone.....	371 - 374
Marl with layers of hard sandstone.....	374 - 417
Hard sandstone with thin layers of marl.....	417 - 437
Marl.....	437 - 515
Cemented shell with thin layers of sandstone.....	515 - 523
Tertiary and Cretaceous (?):	
Marl with thin layers of sandstone.....	525 - 650
Marl with layers of shell to 720 feet.....	650 - 780
Sandstone.....	780 - 790
Marl with thin layers of sandstone.....	790 - 810
Sandstone with layers of marl 2 to 3 feet thick.....	810 - 900
Marl and shells with thin layers of sandstone.....	900 - 955
Sandstone with hard layers.....	955 - 1,000
Soft sandstone.....	1,000 - 1,030
Soft, loose sand with layers of marl.....	1,030 - 1,170
Hard sandstone with layers of marl.....	1,170 - 1,190
Marl with hard layers of sandstone.....	1,190 - 1,216
Marl with thin layers of sandstone.....	1,216 - 1,306

Tertiary and Cretaceous (?)—Continued.

	Feet.
Very hard quartz rock.....	1,306 -1,309
Hard sandstone.....	1,309 -1,312
Sandstone with hard layers; hard sandstone at 1,372-1,373 feet.....	1,312 -1,373
Marl; sandy marl at 1,381-1,392 feet.....	1,373 -1,400
Cemented shell and marl.....	1,400 -1,412
Marl; sticky marl at 1,465-1,492 feet.....	1,412 -1,540
Sandstone.....	1,540 -1,550
Marl with iron pyrite.....	1,550 -1,565
Green marl with hard layers of sandstone.....	1,565 -1,570
Marl with layers of sandstone.....	1,570 -1,590
Hard sandstone; very hard from 1,595-1,598 feet.....	1,590 -1,598
Marl with layers of sandstone.....	1,598 -1,650
Marl.....	1,650 -1,660
Sandstone.....	1,660 -1,665
Sticky marl with layers of hard sandstone.....	1,665 -1,685
Cemented shell and sandstone with thin layers of marl.....	1,685 -1,695
Hard sandstone and shells with iron pyrite.....	1,695 -1,711
Marl.....	1,711 -1,722
Cemented shell with iron pyrite.....	1,722 -1,734
Hard marl with shells.....	1,734 -1,750
Hard, sticky marl.....	1,750 -1,775
Hard marl with shells.....	1,775 -1,819½
Hard sandstone.....	1,819½ -1,820

Potomac (?):

Soft sandstone; water-bearing.....	1,820 -1,830
Thin layers of hard and soft sandstone; soft water.....	1,830 -1,838
Sandstone; water-bearing.....	1,838 -1,850
Hard sandstone.....	1,850 -1,855
Sandstone; water-bearing.....	1,855 -1,865
Hard sandstone.....	1,865 -1,870
Sandstone with thin layers below 1,880 feet; water-bearing.....	1,870 -1,900
Marl with hard layers of sandstone.....	1,900 -1,920

Rig used, rotary. Casing used, 9-inch to 1,216 feet; 6-inch to 1,820 feet; 4-inch strainer from 1,820 to 1,920 feet. Elevation of well, about 5 feet above mean high tide; of well outlet, about 5 feet above ground. Well flows about 150 gallons per minute. Temperature of water at well mouth, about 98°; quality of water, soft. Pressure at first, about 36 pounds per square inch.

In drilling a puddled-clay water jet was used for the entire depth and no casing (except for about 100 feet near the surface) was placed until a depth of nearly 1,400 feet was reached. Distinctive samples were obtained from only a few of the strata penetrated.

1440. Well near Hampton, Hampton County.

[Well begun in October, 1905; completed November 24, 1905. Authority, J. M. Jennings, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

This record shows care in discriminating and describing formations, and as few records have been published from Hampton County it is of more than average importance. The upper formations described are thought to be of Eocene age; the water-bearing sand may be Cretaceous.

Record of well 6 miles west of Hampton.

Eocene:

Very fine, soft white sand containing some light-gray marl, quicksand; water-bearing.....	Feet. 75-145
Medium-hard gray and greenish limy sandstone.....	145-160
Soft dark-greenish marl, sticky but not gritty; contains bits of shells.....	160-200
Soft grayish marl containing a little very fine sand and very little, if any, water.....	200-300

Eocene or Cretaceous (?):	Feet.
Soft light-grayish marl or limestone composed largely of shell fragments, hard and soft in layers.....	300-350
Soft grayish sandy marl, about one-half sand, with a few grains of glauconite, hard and soft layers; no water.....	350-400
Cretaceous:	
Soft grayish sandy marl, softer than preceding.....	400-440
Medium-hard light brownish-gray marl, some shell fragments, not sticky....	440-550
Soft limestone composed largely of shell fragments, with gray, brown, and red clay, a little glauconite, and colorless and greenish quartz grains.....	550-735
Soft gray sand, slightly micaceous, with considerable glauconite in fine to coarse grains—water-bearing; the formation to which all deep wells about Hampton are sunk. Mr. Jennings says it is in places over 300 feet thick.	735
Rig used, hydraulic. Diameter of well, 2 inches. Casing, 650 feet of 2-inch. Water at 40, 145, and 735 feet. Water rises 75 feet above surface; flows 70 to 80 gallons per minute.	

1448. Well at Bishopville, Lee County.

[Well begun July 21, 1905; completed August 1, 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Incomplete series of samples preserved. Geologic correlations by W. B. Clark.]

This well gets water from a gravel bed in the Potomac (fresh-water Cretaceous) group. The Potomac covers the greatest area and is about the most important of all the water-bearing formations in the series of sediments underlying the Atlantic Coastal Plain from New Jersey to Georgia.

Record of well at Bishopville.

Potomac:	Feet.
Pink sandy clay.....	1- 20
Soft light-buff clay.....	20- 30
Coarse white sand.....	30-165
Coarse reddish sand; artesian water.....	165-185
Sand and clay in layers.....	185-220
Tough gray pipeclay and sand.....	220-240
Tough gray pipeclay.....	240-258
Hardpan rock.....	258-262
Coarse red gravel; fine supply of good water.....	262-292

Rig used, rotary. Diameter of well, 8 inches from surface to 160 feet; 6 inches from 160 to 262 feet. Casing to 262 feet. Cook 6-inch strainer, 262 to 292 feet. Water stands at 19 feet below surface. Well yields 19 gallons per minute for each foot head is depressed from 22 to 26 feet.

1449. Well at Orangeburg, Orangeburg County.

[Well begun and completed in June, 1905. Authority, Hughes Specialty Well Drilling Company, contractor. Samples preserved. Geologic correlations by W. B. Clark.]

This is one of a group of three wells. Water is obtained from a bed of sand that was deposited in Eocene time. The formations penetrated are the Lafayette (Pliocene) loam and clay and Eocene marl and sand.

Record of well one-eighth mile east of Atlantic Coast Line station, Orangeburg.

Pliocene:	Feet.
Yellow sandy loam.....	1- 2
Orange sandy clay.....	2- 30
Eocene:	
Soft buff marl (no sample).....	30- 40
Hard white cherty limestone.....	40- 45
Tough sticky gray marl.....	45- 55
Marl rock (light-gray, loosely compacted limestone).....	55-160

Eocene—Continued.

	Feet.
Tough gray marl (fossiliferous)	160-190
Water stratum (gray sand, white sand, and coarse quartz gravel)	190-208
Fine gray sand and marl	208-228

Rig used, rotary and jet. Diameter of wells, 4½ inches. Length of casing, about 60 feet. Water rises to 12 feet from surface; pumping 400 gallons per minute from three wells; depressed head about 80 feet. Quality, hard.

SOUTH DAKOTA.

1455. Well 11 miles west of Carthage, Beadle County.

[Well begun October 30, 1904; completed November 6, 1904. Authority, H. B. Potter, contractor and driller. No samples. Geologic correlations checked by N. H. Darton.]

This flowing well in the southeastern part of Beadle County obtains water from the Dakota sandstone. The formations penetrated are the drift (Pleistocene) and underlying rocks of Cretaceous age, the Pierre shale, and the Niobrara, Benton, and Dakota formations. The geology of the surrounding region and the depths to the water-bearing formations are discussed in the Huron and De Smet folios (Nos. 113 and 114) of the Geologic Atlas of the United States.

Record of well in the SW. ¼ SW. ¼ sec. 26, T. 109, R. 59.

	Feet.
Drift and Pierre:	
Clay and shale	1-326
Niobrara:	
Chalk rock	326-335
Niobrara and Benton:	
Hard layers with soft material between, black oily substance	335-350
Blue shale with hard layers	350-500
Sandstone and hard layers	500-700
Dakota:	
Cap rock 6 inches thick	767
Dakota sandstone	767-818

Rig used, jet. Casing used, 804 feet of 2-inch. Flow, 85 gallons per minute.

1458a. Well near Roswell, Miner County.

[Well begun November 22, 1905; completed December 10, 1905. Authority, H. B. Potter, driller. No samples. Geologic correlations checked by N. H. Darton.]

This well is one of the many in the Dakotas obtaining flowing water from the Dakota sandstone. The formations underlying the Glacial clay, sand, and gravel are of Cretaceous age. Their order, from top to bottom, is as follows: Pierre, Niobrara, Benton, and Dakota.

Record of well in the SE. ¼ sec. 31, T. 107, R. 57.

	Feet.
Drift:	
Clay	1- 4
Sand and gravel	4- 50
Blue clay	50- 90
Pierre:	
Shale	90-290
Niobrara:	
Chalk rock	290-340
Niobrara and Benton:	
Shale and soft shale	340-582
Shale with hard layers, 12 in all, very hard layer at 633-634 feet	582-634
Dakota:	
Sandstone	634-672
Honeycomb sandstone, very porous	672-710

Rig used, jet. Casing used, 696 feet of 2-inch. Well flows 95 gallons per minute; quality of water, soft.

TEXAS.

1521. Well near San Antonio, Bexar County.

[Well begun April 1, 1904; completed June 1, 1905. Authority, J. P. Benkendorfer, contractor and driller. No samples.]

A number of deep artesian wells have been drilled in or near San Antonio. The city lies in a strip of country between the Gulf Coastal Plain and the Edwards Plateau, the strip being a faulted zone in which the flat-lying rocks of the plateau have been more or less broken and tilted. Hence records may show considerable variations, even when wells are but a short distance apart. The rocks are partly in the Gulf series, or Upper Cretaceous, and partly in the Comanche series, or Lower Cretaceous. Those penetrated by this well probably belong to these formations: Uvalde (Pliocene), Taylor marl, Austin chalk, Eagle Ford shales (Upper Cretaceous); Buda limestone, Del Rio clays, Georgetown and Edwards limestones (Lower Cretaceous).

Record of well 4 miles southwest of San Antonio.

	Feet.
Brown loam.....	0- 8
Cement gravel.....	8- 25
Yellow clay.....	25- 60
Blue clay.....	60- 600
Magnesian limestone; strong vein of water containing a little sulphur and oil rose within 50 feet of surface.....	600- 720
Yellow limestone; strong sulphur water.....	720- 800
Blue, gray, or yellow limestone.....	800- 910
"Lignite".....	910- 950
Hard blue and white limestone.....	950-1,000
Rotten blue clay.....	1,000-1,054
Crystalline limestone; water bearing; small flow rose to 12 feet above surface.	1,054-1,185
"Sulphur rock".....	1,185-1,250
White limestone.....	1,250-1,350
Porous yellow limestone, full of crevices, making it difficult to keep hole in good condition.....	1,350-1,453

Rig used, standard. Casing used, 400 feet of 10-inch; 600 feet of 8-inch; 1,054 feet of 6-inch. All water above 1,054 feet cased off. Main supply has a static head of + 6 feet; flow, about 300 gallons per minute. Quality, soft, slightly iron bearing.

1526. Well at San Antonio, Bexar County.

[Well completed in October, 1902. Authority, Milo M. Garvin, driller. No samples.]

This partial log of a deep well at San Antonio gives the higher water-bearing formations there.

Record of well in South Flores street, San Antonio.

	Feet.
Earth.....	0- 4
Yellow clay.....	4- 44
Gravel and water.....	44- 59
Blue clay.....	59- 900
"Adobe lime".....	900-1,110
Cap-rock sandstone; show of brown, frothy oil and some gas.....	1,110-1,130
White limestone; cold sulphur water at 1,137-1,140 feet; flow; temperature, 72° at well mouth.....	1,130-1,140
Limestone.....	1,140-1,235
Blue clay.....	1,235-1,275
Limestone.....	1,275-1,310

	Feet.
Black mud, caves.....	1, 310-1, 370
Blue limestone.....	1, 370-1, 410
Yellow "magnesia;" flow.....	1, 410-1, 413

Casing used, 60 feet of 10-inch; 669 feet of 8-inch; 975 feet of 6-inch; 435 feet of 5 $\frac{3}{8}$ -inch. Last flow was in porous rock, "looking like coarse yellow sponge with chalky substance in pores." Finished well flows 4-inch stream of fresh water.

1547. Well near Sauz, Cameron County.

[Well begun in November, 1903; completed in March, 1904. Authority, J. H. Titus, town-site engineer, K. T. and S. Co.]

Sauz is near the center of Cameron County, the southernmost county of Texas. The well shows the character of the formations underlying the surrounding country to a depth of 1,600 feet or more. The rocks penetrated are probably of Tertiary and post-Tertiary age.

Record of well 7 miles southeast of Sauz.

	Feet.
Sand and clay.....	1- 18
White sand; salty water.....	18- 26
Dark clay.....	26- 36
Sand; salty water.....	36- 50
Sandy clay.....	50- 120
Red sand; salty water.....	120- 140
White sandy clay.....	140- 190
Sticky clay and rock.....	190- 370
Black sand; salty water.....	370- 400
Sandy clay and rock.....	400- 446
Sand and lignite.....	446- 465
Sand and loose rock.....	465- 521
Bluish clay; loose bowlders and some shell.....	521- 606
Hard rock and flint gravel.....	606- 627
Blue clay 81 feet; blue clay and bowlders 52 feet; hard blue clay 25 feet.....	627- 855
Sandstone.....	855- 865
Very hard rock, hard to drill.....	865- 880
Bluish clay and rock.....	880- 953
Very hard rock, hard to drill.....	953- 965
Very dark greenish clay.....	965- 968
Black sand.....	968- 973
Sandstone.....	973- 981
Very fine sand.....	981- 990
Hard rock.....	990- 993
Blue clay.....	993- 995
Hard sandstone.....	995-1, 003
Blue clay.....	1, 003-1, 044
Sandstone.....	1, 044-1, 360
Very white sandy clay.....	1, 360-1, 428
Sandstone and blue clay.....	1, 428-1, 435
Sandy clay, very hard and dry.....	1, 435-1, 520
Red and blue clay and rock.....	1, 520-1, 540
Red clay and bowlders.....	1, 540-1, 613

Rig used, jet. Diameter of well, 6 $\frac{3}{8}$ inches at mouth, 4 $\frac{1}{4}$ inches at bottom. Principal supply of water from 1,613 feet. Flows about 135 gallons per minute. Static head not determined. Quality, alkaline, iron bearing. Temperature, not determined; hot.

1550. Well near Henrietta, Clay County.

[Well begun and completed in April, 1904. Authority, J. J. Myers, contractor. No samples.]

This well, according to the contractor, is a fair representative of the wells sunk in what is known as the Henrietta oil field. The sand, as the log shows, is near surface and the wells are mostly small producers. The rocks probably should be included in the Pennsylvanian series of the Carboniferous system. They are part of the "red beds."

Record of well on Lockridge farm.

	Feet.
Reddish sandy soil.....	0- 2
Reddish clay.....	2-263
Sand; oil bearing.....	263-280
Red clay.....	280-375
Sand containing salt water.....	375-385
Soft red shale and clay, dry like joint clay.....	385-476

Rig used, cable. Casing used, 476 feet of 5 $\frac{3}{8}$ -inch. Oil sand yielded 5 barrels in first twenty-four hours. Salt water at 375 feet rises nearly to surface.

1553. Well near Trickham, Coleman County.

[Well begun March 14, 1905; drilling stopped in July, 1905. Authority, Milo M. Garvin, driller. No samples.]

This deep well was drilled for oil. The rocks penetrated are part of the Pennsylvanian (Coal Measures) series, which, in this part of the Texas coal fields, has been divided by the Texas Survey into the Strawn, Canyon, and Cisco groups. The mouth of this well is apparently near the base of the Cisco group, so the rocks mentioned are nearly all in the Canyon group. The total thickness of the Coal Measures may be 4,000 feet.

Record of well on W. F. Guthrie ranch, 1 $\frac{1}{2}$ miles southwest of Trickham.

	Feet.
Soft red clay.....	0- 12
Soft red sandstone.....	12- 22
Hard blue clay or shale.....	22- 52
Soft dark gravel.....	52- 56
Hard blue limestone.....	56- 61
Soft blue clay or shale.....	61- 66
Hard dark limestone.....	66- 70
Soft dark clay or shale.....	70- 75
Hard light limestone.....	75-130
Black sticky shale.....	130-133
Hard dark limestone.....	133-156
Dark firm shale.....	156-160
Hard dark limestone.....	160-165
Soft black shale.....	165-170
Hard light limestone; gas at 215 feet, burned 1 foot high out of 1-inch pipe; gas comes up through 215 feet of salt water.....	170-278
Soft dark shale.....	278-297
Soft light sharp sandstone; salt water.....	297-328
Light sticky shale.....	328-375
Hard dark limestone.....	375-380
Red sticky clay or shale.....	380-400
Hard gray limestone.....	400-436
Soft blue clay or shale; landed 8 $\frac{1}{4}$ -inch casing at 446 feet.....	436-446
Hard white limestone.....	446-456
Soft dark shale.....	456-470
Hard brown limestone.....	470-474

	Feet.
Firm dark shale.....	474-510
Hard dark limestone.....	510-523
Firm dark shale.....	523-540
Hard white limestone.....	540-571
Firm dark shale.....	571-610
Soft brown shale.....	610-670
Firm dark sandstone.....	670-690
Soft dark shale.....	690-715
Soft yellow shale.....	715-761
Hard gray sandstone.....	761-770
Soft dark shale.....	770-810
Soft brown sandstone.....	810-830
Soft dark shale.....	830-865
Hard gray sandstone.....	865-873
Soft dark shale.....	873-885
Hard gray sandstone.....	885-896
Soft brown shale.....	896-908
Hard gray sandstone.....	908-940

Rig used, cable. Casing used, 446 feet of 8 $\frac{1}{4}$ -inch; 940 feet of 6 $\frac{1}{4}$ -inch. Pressure of gas found at 215 feet not tested. Salt water from 297 to 328 feet gave a flow of about 200 gallons per minute.

1566. Well near Dallas, Dallas County.

[Well begun October 15, 1902; completed in January, 1904. Authority, J. M. Bassett, chief engineer Dallas waterworks. No samples. Geologic correlations checked by A. C. Veatch.]

This deep well develops the so-called Trinity sand, which is a water-bearing bed of sand or sandstone near the base of the Lower Cretaceous (Comanche) series. The well starts in rocks of the Upper Cretaceous (Gulf) series. The formations penetrated are in downward order, Austin chalk, Eagle Ford shale, Woodbine sand, Denison, Fort Worth, Preston, and Goodland limestones, and Antler sands, the latter including water-bearing beds that are sometimes differentiated as the Paluxy, Glen Rose, and Trinity sands.

Record of city well, 2 miles northwest of Dallas post-office.

	Feet.
Soil (and alluvium).....	0- 90
Austin chalk and Eagle Ford shale.	
Limestone.....	90- 760
Woodbine:	
Sand; water comes to surface.....	760- 780
Denison, Fort Worth, Preston, and Goodland:	
Blue shale.....	780- 900
Limestone.....	900-1,500
Antlers sands:	
Paluxy sand; flow of good water, 150,000 gallons in twenty-four hours..	1,500-1,580
Soft marls with hard strata.....	1,580-1,890
Blue shale.....	1,890-1,910
White porous limestone; strong flow, 960,000 gallons in twenty-four hours; pressure 100 pounds; temperature, 96°.....	1,910-1,930
Blue shale.....	1,930-2,180
Sand; another flow, same water.....	2,180-2,210
Variegated clay and sand; no water.....	2,210-2,400
Trinity sand; strong flow from 3 $\frac{3}{4}$ -inch hole and 4-inch casing; 640,000 gallons in twenty-four hours; pressure, 125 pounds; temperature, 100°; good water.....	2,410-2,585

Rig used, rotary. Casing used, 1,013 feet of 8-inch; 600 feet of 6-inch; 700 feet of 4-inch. Flow, 660 gallons per minute; quality, hard; too mineralized for boiler use.

1569. Well near Carrizo Springs, Dimmit County.

[Well begun in May, 1903; completed in June, 1903. Authority, F. Moehrig, driller. No samples.]

A considerable number of flowing wells have been drilled in the vicinity of Carrizo Springs. The formations penetrated are largely sands and sandstones thought to be of early Tertiary age.

Record of well 3 miles north of Carrizo Springs.

	Feet.
Red sandy loam.....	0- 3
Red clay mixed with sand.....	3- 20
White sand.....	20- 35
Gravel.....	35- 37
Yellow clay.....	37- 40
Blue clay with layers of black material, looked like lignite.....	40-380
Sandstone—well began to flow.....	380-440
Blue rock.....	440-470
Sandstone—struck best flow here.....	470-500
Blue clay.....	500-550

Rig used, cable. Casing used, 330 feet of 5½-inch. Well flows 150 gallons per minute. Quality, soft.

1574. Well near Benavides, Duval County.

[Well begun August 7, 1905; completed September 15, 1905. Authority, Lawson & Knight, contractors and drillers. No samples.]

This log of one of the shallow wells drilled for oil in the Piedras Pintas district, Duval County, shows the character of the rocks overlying the productive formation. These rocks are believed to be of Tertiary age.

Record of well No. 6, on W. A. Tinney farm, in the NW. ¼ sec. 8.

	Feet.
Soil.....	0- 2
Hard flint ballast.....	2- 20
Tough yellow clay.....	20- 85
Tough blue clay.....	85-200
Hard shale.....	200-227
Sand with water, oil, and gas; water rose 150 feet.....	227-231
Hard blue clay.....	231-400
Dark-blue clay with gravel; gas.....	400-465
Hard dark-green shale.....	465-498
Shale; oil and gas.....	498-500

Rig used, cable. Casing used, 467 feet of 6-inch. Estimated initial yield of oil, 12 barrels in twenty-four hours. Pressure of gas not tested. Quality of oil, heavy.

1604. Well near Schulenburg, Fayette County.

[Well begun September 2, 1904; completed November 20, 1904. Authority, James Maresh. No samples.]

This log is indefinite, but is given because few well records from Fayette County have been published. The formations penetrated are thought to be of Eocene age and may belong in part to the Fayette formation.

Record of well at Schulenburg.

	Feet.
Filled ground.....	0- 12
Yellow sandstone.....	12- 22
Yellow clay.....	22- 30
Yellow sandstone.....	30- 35
Sand and sandstone.....	35- 92
Hard white rock.....	92- 94

	Feet.
Rock and brown and blue clay	94-197
White rock	197-200
Blue and gray clay	200-240
Blue and gray hard clay	240-268
Fine sand; water-bearing	268-284
Rock	284-300
Soft clay	300-326
Rock and clay	326-350
Hard rock	350-352
Clay	352-365
Rock	365-380
Boulders and clay	380-400
Rock and clay	400-420
Sandstone	420-422
Hard rock	422-425
Boulders and clay	425-434
Clay	434-443
Sandstone	443-450
Clay	450-470
Hard rock	470-473
Soft clay	473-528
Boulders and clay	528-534
Clay	534-575
Hard rock	575-580
Hard clay	580-583
Hard rock	583-586
Sandstone	586-600
Blue sand with layers of rock	600-670
Boulders and rock	670-690
Sand; water-bearing	690-700
Blue clay	700-720

Rig used, rotary. Casing used, 9 $\frac{1}{8}$ -inch from top to 290 feet; 8 $\frac{1}{4}$ -inch from 290 to 720 feet.

1606. Well near Rosenberg, Fort Bend County.

[Well begun July 10, 1904; completed July 24, 1904. Authority, I. W. Lawson, contractor and driller.]

This shallow well obtains water from a gravel bed thought to be in the Lafayette formation. The supply is good.

Record of well $4\frac{1}{2}$ miles southwest of Rosenberg.

	Feet.
Hard black soil	1- 6
Soft red clay	6- 18
Quicksand; fine, but little water	18- 28
Hard red gumbo	28- 85
Coarse gravel; water not alkaline	85-125
Soft red clay	125-200
Fine blue gravel; water	200-260
Hard blue clay	260-300

Rig used, rotary. Casing used, 260 feet of 9 $\frac{1}{8}$ -inch. Supply from 200 to 260 feet. Water rises within 30 feet of surface, but is depressed 70 feet by pumping 1,000 gallons per minute. Quality, slightly alkaline.

1620. Well at Schertz, Guadalupe County.

[Well completed in 1903. Authority, J. P. Benkendorfer, driller. No samples.]

Schertz is near the western corner of Guadalupe County, in a region that has not been mapped by the Survey. The formations penetrated by this well are believed to be included in the Upper and the Lower Cretaceous series. A water-bearing horizon at 325 feet may be in the Austin chalk and one at 830 feet in the Edwards formation.

Record of well 300 feet east of Schertz post-office.

	Feet.
Brown sand.....	0- 6
Red clay.....	6- 16
Concrete gravel.....	16- 32
Yellow clay.....	32- 46
Blue clay.....	46-261
Magnesian limestone.....	261-301
White limestone 20 feet; yellow limestone 5 feet; gray limestone 89 feet.....	301-415
"Lignite".....	415-450
Gray limestone.....	450-510
Blue mud.....	510-565
Blue limestone 60 feet; gray limestone 45 feet; blue limestone 50 feet.....	565-720
Gray limestone 82 feet; white limestone 25 feet; gray limestone 45 feet.....	720-872

Casing used, 60 feet of 8-inch; 553 feet of 6-inch. Principal water bed at 830 feet; another at 325 feet. Main supply is salt, sulphur water which rises within 50 feet of surface.

1632. Well near Saratoga, Hardin County.

[Well begun December 22, 1904; completed February 16, 1905. Authority, H. B. Goodrich, manager fuel-oil properties, Gulf Coast and Santa Fe Railway, owner. No samples.]

This is an excellent log of a big gusher in the Saratoga pool. The oil-bearing rocks of this well, as of many others in the Coastal Plain region of southeastern Texas, are of Tertiary age. They are overlain by clays, soft shales, and sands. Here and there the sands are consolidated enough to be sandstones, the sand grains being, in some cases, held together by a limy cement. Such thin beds of limy sandstone probably constitute most of the "rock" reported by drillers. "Gumbo" is a Gulf coast name for sticky clay—blue, gray, yellow, or mottled in color—sometimes containing hard, limy concretions.

An account of the Saratoga and other oil pools is given in Bulletin No. 282, "Oil fields of the Texas-Louisiana Gulf coast," by N. M. Fenneman.

Record of well No. 4A, in southeast corner of Petty tract, one-half mile east of Saratoga.

	Feet.
Surface sand.....	1- 10
Red clay.....	10- 30
Fine gray sand.....	30- 115
Gumbo.....	115- 128
Sand.....	128- 161
Shale.....	161- 184
Sand.....	184- 230
Gumbo.....	230- 270
Sand.....	270- 279
Gumbo.....	279- 338
Sand.....	338- 378
Soft rock.....	378- 380
Gumbo.....	380- 410

	Feet.
Sand, contains water.....	410 - 535
Gumbo.....	535 - 565
Sand.....	565 - 574
Gumbo.....	574 - 676
Soft, gypsaceous gumbo.....	676 - 694
Gumbo with bowlders (probably concretions).....	694 - 701
Hard shale.....	701 - 717
Gumbo.....	717 - 856
Gravel; waterworn quartz pebbles.....	856 - 861
Sand.....	861 - 863
Gumbo.....	863 - 874
Rock.....	874 - 877
Sand and gravel, gravel alone below 883 feet.....	877 - 891
Gumbo.....	891 - 906
Rock; fine, hard limestone.....	906 - 913
Gumbo with gypsum layers.....	913 - 940
Gypsum rock.....	940 - 942
Shale.....	942 - 946
Rock.....	946 - 947
Gumbo.....	947 - 980
Sand.....	980 - 992
Gumbo.....	992 - 1,003
Rock.....	1,003 - 1,010
Gumbo.....	1,010 - 1,028
Gravel.....	1,028 - 1,042
Gumbo.....	1,042 - 1,047
Hard sand rock.....	1,047 - 1,048
Gumbo.....	1,048 - 1,073
Rock.....	1,073 - 1,073½
Rock, with large quantity of mica.....	1,073½ - 1,078
Gravel.....	1,078 - 1,109
Rock.....	1,109 - 1,112
Shale.....	1,112 - 1,122
Rock.....	1,122 - 1,124
Shale.....	1,124 - 1,150
Gumbo, with gypsum below 1,185 feet.....	1,150 - 1,202
Gumbo and iron pyrite.....	1,202 - 1,206
Rock.....	1,206 - 1,209
Shale.....	1,209 - 1,212
Soft rock.....	1,212 - 1,216
Hard shale.....	1,216 - 1,228
Gumbo.....	1,228 - 1,258
Shale, with two small layers of rock, good showing of oil at 1,230 to 1,280 feet.....	1,258 - 1,270
Hard rock.....	1,270 - 1,271
Shale.....	1,271 - 1,281
Gumbo.....	1,281 - 1,290
Hard shale.....	1,290 - 1,310
Very hard shale.....	1,310 - 1,315
Shale and oil sand.....	1,315 - 1,340
Tough gumbo.....	1,340 - 1,342
Shale and oil sand.....	1,342 - 1,350

	Feet.
Oil sand and thin beds of rock, mixed.....	1, 350-1, 387
Sand.....	1, 387-1, 430
Gumbo.....	1, 430-1, 432

Rig used, rotary. Casing used, 12-inch to 4-inch; 1,270 feet of 4-inch; strainer, 163½ feet long, with boot leg at 1,224 feet. Well gushed and flowed for sixty days. Initial yield, 5,000 barrels in twenty-four hours. Yield in one year, over 100,000 barrels. Was pumping 100 barrels daily in March, 1906.

1635. Well near Westfield, Harris County.

[Well begun November 10, 1905; completed November 26, 1905. Authority, Harry A. Roberts, driller. Incomplete series of samples preserved.]

This log of a well in northern Harris County gives more details than the logs of many of the wells put down in the oil fields of Louisiana and Texas. "Gumbo," a word frequently used, means sticky clay. "Rock" may be thin layers of sandstone or limestone. Some of the beds of sand contain strata consolidated enough to be sandstone.

The formations penetrated by this well are of Quaternary and Tertiary age and include the Columbia sands (Pleistocene), Lafayette sands, and the underlying beds of clay, sand, sandstone, and limestone of undetermined age, which have been correlated with the Grand Gulf of Alabama and Mississippi.

The character of these formations and the occurrence of oil in the various pools is described in Bulletin No. 282, "Oil fields of the Texas-Louisiana Gulf coast," by N. M. Fenneman.

Record of well No. 3, on Dunn farm, 3 miles northeast of Westfield.

	Feet.
Soft red and yellow clay and sand.....	0- 43
Soft white sand; water-bearing.....	43- 62
Soft yellow clay, solid formation.....	62-129
Soft white sand; water-bearing.....	129-139
Soft yellow clay.....	139-151
Soft white sand; water-bearing.....	151-161
Soft yellow clay.....	161-198
Soft white sand; water-bearing.....	198-215
Soft red and yellow clay, mostly red.....	215-296
Soft gray sandstone.....	296-298
Soft white sand; water-bearing.....	298-312
Medium-hard gray marl.....	312-359
Soft gray shaly sandstone.....	359-362
Soft gray marl.....	362-366
Medium-hard gray limestone.....	366-370
Medium-hard dark-gray marl containing much sand.....	370-388
Very hard dark-gray rock, called "quartzite" by driller.....	388-390
Medium-soft red and gray gumbo.....	390-410
Hard white rock.....	410-413
Medium-soft gray gumbo.....	413-422
Very hard rock.....	422-425
Medium-soft gray gumbo.....	425-440
Medium-soft gray sandstone.....	440-443
Medium-soft gray gumbo with intermingled sand.....	443-460
Medium-hard gray rock.....	460-462
Medium-soft gray gumbo.....	462-497
Soft white sand; water-bearing.....	497-517
Medium-hard white sandstone.....	517-520
Soft white sand; water-bearing.....	520-543

	Feet.
Medium-soft gray gumbo with sand.....	543-573
Medium-hard white sandstone.....	573-577
Medium-soft gray gumbo (sticky, limy clay).....	577-611
Soft gray rock.....	611-613
Soft white to brownish sand; water-bearing.....	613-638
Soft white sandstone.....	638-641
Medium-soft gray and yellow sandy gumbo (sticky, limy clay).....	641-650
Hard gray rock (fine sandstone).....	650-654
Soft white limy sand; water-bearing.....	654-684
Medium-soft gray gumbo with sand.....	684-698
Soft gray limestone.....	698-715
Medium-soft gray gumbo or marl.....	715-737
Hard gray limestone.....	737-739
Medium-soft gray gumbo or marl.....	739-760
Gray limestone—top soft, bottom hard.....	760-772
Medium-soft gray gumbo or marl with large bowlder (presumably limy concretion) from 792 to 794 feet.....	772-794
Soft white sand; water-bearing, with soft gray sandstone from 815 to 818 feet....	794-830
Medium-soft gray gumbo or marl.....	830-831

Rig used, rotary. Diameter of well, $8\frac{1}{2}$ inches at mouth; $5\frac{1}{2}$ inches at bottom. No oil found and but a very light showing of gas.

1641. Well near Kyle, Hays County.

[Well completed in 1903. Authority, J. E. Donnelly, driller. No samples. Geologic correlations checked by A. C. Veatch.]

This well, drilled for oil 15 miles southeast of Kyle, found at 1,320 feet the same limestone (the Austin chalk) which outcrops in the vicinity of Kyle. The formations penetrated range in age from early Tertiary to middle Cretaceous and include the Lytton formation (Eocene), Webberville formation, Taylor marl, Austin chalk, Eagle Ford clay and limestone (Upper Cretaceous or Gulf series), Buda limestone (Lower Cretaceous or Comanche series). It is not possible from the driller's log to separate the three formations first penetrated. In the "blue clay and bowlders" from 439 to 1,320 feet probably about 200 feet of the Austin chalk, its upper marly beds, are included.

The geology of the country near Austin, including a large part of Travis County and portions of Hays, Bastrop, and Caldwell counties, is described in the Austin folio (No. 76) of the Geologic Atlas of the United States.

Record of well 15 miles southeast of Kyle.

	Feet.
Black soil.....	1- 6
Lytton:	
Yellow clay.....	6- 54
Webberville and Taylor:	
Blue clay, little sand with little oil; water at 160 to 165 feet.....	60- 160
Blue clay with bowlders.....	160- 437
Oil sand and oil.....	437- 439
Blue clay and bowlders.....	439-1,320
Austin chalk:	
White limestone.....	1,320-1,560
Eagle Ford:	
Blue clay with shells.....	1,560-1,608
Buda:	
Rock.....	1,608-1,620

Rig used, cable. Casing used, 650 feet of $6\frac{1}{2}$ -inch; 670 feet of $5\frac{1}{2}$ -inch.

1650. Well 14 miles northwest of Jasper, Jasper County.

Well begun June 27, 1905; completed July 21, 1905. Authority, George P. Sweat, of Radium Oil Company, owner. Incomplete series of samples preserved.]

This log of a wild-cat well, though evidently generalized, contains some observations not found in many logs of wells along the Texas Gulf coast. The formations penetrated are mostly of Tertiary age and may include the Lafayette sands, "buried beds," Frio clays, and Fayette sands.

Record of well 14 miles northwest of Jasper.

	Feet.
Soft blue (or dark-gray) shale and limestone	100- 200
Hard blue shale with sandstone to 250 feet, containing pyrite below.	200- 300
Soft blue shale with limestone.	300- 720
Sand; waterbearing.	720- 730
Soft blue gumbo.	730- 935
Soft blue gumbo (dark sandy clay) containing lignite.	935- 945
Soft, very sticky gumbo.	945-1,250
Soft blue shale.	1,250-1,300
Hard blue rock, described as a kind of sandstone with sea shells.	1,300-1,375
Soft blue shale.	1,375-1,520

Rig used, rotary. Casing used, 63 feet of 12-inch; 683 feet of 8-inch. Not a show of oil.

1657. Well at Cleburne, Johnson County.

[Well begun in January, 1903; completed in August, 1903. Authority, J. J. Myers, contractor and driller. No samples. Geologic correlations checked by A. C. Veatch.]

This well obtains water from a permeable bed or reservoir near the base of the Lower Cretaceous (Comanche) series. This bed occurs in what has been termed the Trinity division of the Lower Cretaceous and is one of the so-called Trinity sands. The well penetrates nearly the full succession of beds in the series, these beds being marls, limestones, and clays, with the porous sands or sandstones. The formations, in downward order, are Fort Worth, Preston, Edwards, and Comanche Peak limestones and marl, Paluxy sand, and Glen Rose formation, including the Trinity sand.

Record of Gulf, Colorado and Santa Fe Railway well No. 3.

	Feet.
Rock (probably limestone).	0- 20
"Soapstone" rock and black shale (probably marl and limestone)	20- 435
Sand; water-bearing; water rose 300 feet (Paluxy)	435- 450
Rock and shale.	450- 500
Sand; water-bearing; water rose 375 feet (Paluxy)	500- 525
Layers of extremely hard rock underlain by a black shale which caves badly when water touches it.	525- 660
Soft white rock.	660- 925
Sand; water-bearing; water rose 750 feet (Trinity).	925- 950
Rock and sandy blue clay.	950-1,004
Very hard sandstone.	1,004-1,008
Sandy shale.	1,008-1,030
Sand; water-bearing (Trinity) shale and rock.	1,030-1,105
Sandstone.	1,105-1,200

Rig used, cable and rotary. Casing in well, 1,135 feet of 6-inch. Main supply of water at 1,060 feet. Well yields 160 gallons per minute by air lift.

1669. Well near Comfort, Kendall County.

[Authority, Adolph Bartel, driller. No samples.]

Kendall County covers a part of the Edwards Plateau. The rocks of the plateau lie almost horizontal. They are of Lower Cretaceous (Comanche) age, but not enough detailed mapping has been done to correlate particular formations with beds reported by drillers.

Record of well 2 miles southwest of Comfort.

	Feet.
Limestone.....	6- 20
Blue clay.....	20- 25
Gray shale.....	25- 45
Hard sandstone; water-bearing.....	45- 50
Blue limestone; harder toward bottom.....	50-180
Blue sandstone.....	180-190
Green clay.....	190-194
Blue sandstone; red and green sand in cuttings.....	194-218
Very hard rock.....	218-222
Varicolored sand, red, green, black, and white; water-bearing.....	222-224
Very hard rock; dressed bit every 5 inches.....	224-225
Sand; water-bearing.....	225-226

Rig used, cable. Casing used, 90 feet of 6-inch. Water from 225 feet rises within 85 feet of surface.

1678. Well at Lampasas, Lampasas County.

[Well completed in 1903. Authority, W. B. Abney, owner. No samples.]

At Lampasas is a group of noted hot springs that rise from crevices in Carboniferous limestone. This well, according to the driller, went down into granite. The nearest exposure of granite is on Colorado River, 30 miles to the southwest. Little is known of the thickness of the Cambro-Ordovician rocks underlying the Carboniferous, but as they may lie nearly horizontal it is possible that the well goes into granite for the distance given, though the rocks at the base of the Cambro-Ordovician, in Llano County, to the west, are sandstones.

Record of well on block 9, Hanna Springs addition to Lampasas.

	Feet.
Yellow clay.....	0- 25
Gravel; water-bearing.....	25- 30
Yellow clay.....	30- 40
Concrete.....	40- 45
Gray limestone 150 feet; dark limestone 10 feet; gray limestone 235 feet; at 260 feet, salt water which will yield 25 gallons per minute by pumping.....	45- 440
Shale.....	440- 470
Gray limestone; at 540 feet flow of sulphur water, 10 gallons per minute; at 1,110 feet strong vein of salt water which rises within 25 feet of surface; at 1,560 feet another strong salt-water vein.....	470-1,560
Marble.....	1,560-1,920
Granite.....	1,920-2,012

Casing used, 265 feet of 10½-inch; 950 feet of 6-inch. Static head of flow not determined. Temperature, 72° F. Water from combined flows at 540, 1,110, and 1,560 feet is strongly saline.

1686. Well near Dayton, Liberty County.

[Well completed in 1905. Authority, Sun Company, owner. No samples.]

This well, known as the Sun Company Quintette No. 1, on the J. B. Harrison tract, was, up to December 1, 1905, the deepest hole in the Dayton field. The center of development of this field was about one-fourth of a mile farther north. Oil was found there at a depth of about 800 feet. This log shows no striking features; the formations penetrated probably include Columbia and Lafayette sands and the "buried beds." The gravel from 240 to 437 feet is believed to occur in and at the top of the Lafayette.

Record of well in the northeast corner of 50 acres in the northwest corner of the S. $\frac{1}{2}$ sec. 125, Houston and Texas Central Railroad survey.

	Feet.	
Yellow surface clay.....	0-	20
Blue shale.....	20-	33
White sand.....	33-	53
Sand and clay.....	53-	158
White quicksand.....	158-	171
Blue shale.....	171-	180
White sand.....	180-	186
Blue shale.....	186-	193
Gumbo.....	193-	240
Sand and gravel.....	240-	325
Gumbo.....	325-	347
Sand, putty sand.....	347-	358
Sand and gravel.....	358-	437
Shale.....	437-	443
Sand.....	443-	465
Gumbo.....	465-	481
Sand.....	481-	496
Gumbo.....	496-	513
Sand, putty sand.....	513-	527
Gumbo.....	527-	565
Sand, putty sand.....	565-	597
Shale.....	597-	601
Sand.....	601-	613
Gumbo.....	613-	621
Shale, rock, and clay.....	621-	660
Shale.....	660-	672
Hard rock.....	672-	673
Gumbo.....	673-	679
Sand.....	679-	705
Shale.....	705-	730
Gumbo.....	730-	795
Rock.....	795-	799
Gumbo.....	799-	806
Shale.....	806-	818
Gumbo.....	818-	845
Yellow clay.....	845-	855
Gumbo.....	855-	875
Clay.....	875-	884
Gumbo.....	884-	890
Sand, putty sand.....	890-	895
Limestone.....	895-	896
Sand, putty sand.....	896-	904

	Fect.
Coarse sand.....	904- 910
Gumbo.....	910- 933
Sand, putty sand.....	933- 942
Shale.....	942- 958
Rock.....	958- 961
Gumbo and shale.....	961-1,025
Shale, rock, and shale.....	1,025-1,036
Rock.....	1,036-1,038
Shale.....	1,038-1,060
Rock.....	1,060-1,065
Gumbo and shale.....	1,065-1,112
Shale and rock.....	1,112-1,124
Limestone.....	1,124-1,126
Sand, putty sand.....	1,126-1,133
Limestone.....	1,133-1,134
Brown and blue shale.....	1,134-1,167
(No entry).....	1,167-1,245
Boulders (concretions) and rock.....	1,245-1,249
Gumbo.....	1,249-1,290
Shale.....	1,290-1,295
Rock and clay.....	1,295-1,299
Gumbo.....	1,299-1,306
Shale.....	1,306-1,392
Hard sand.....	1,392-1,398
Shale.....	1,398-1,406
Gumbo.....	1,406-1,420
Shale.....	1,420-1,454
Very tough gumbo.....	1,454-1,525
Hard shale.....	1,525-1,552
Shale and gumbo.....	1,552-1,591
White shell and rock.....	1,591-1,598
Blue shale.....	1,598-1,630
Soft rock.....	1,630-1,632
Gumbo.....	1,632-1,640
Hard blue sand with strata of rock.....	1,640-1,650
Blue gumbo.....	1,650-1,680
Rock.....	1,680-1,683
Shale.....	1,683-1,691
Hard sandstone.....	1,691-1,693
Blue shale and blue sand, very slight show of oil.....	1,693-1,705
Blue shale and thin strata of rock.....	1,705-1,718
Blue shale.....	1,718-1,763

Dry hole.

1700. Well near Dunlay, Medina County.

[Well completed January 3, 1903. Authority, Milo M. Garvin, driller. No samples.]

This well was drilled for oil in a region remote from any productive field. The rocks penetrated are parts of the Gulf series (Upper Cretaceous) and of the Myrick formation (Eocene). Of the Cretaceous formations, two, the Anacacho and the Pulliam, carry deposits of asphaltum. These possibly led to the sinking of the well. The Pulliam is below the Anacacho formation and above the Austin chalk.

Record of well on George Haas ranch, $4\frac{1}{2}$ miles southwest of Dunlay.

	Feet.	
Soft white limestone.....	0-	15
Soft yellow clay.....	15-	57
Close blue clay; landed 10-inch drive pipe at 211 feet.....	57-	216
Hard gray sandstone.....	216-	220
Soft blue clay.....	220-	227
Soft white sandstone; water-bearing.....	227-	238
Soft blue clay.....	238-	259
Hard gray sandstone.....	259-	265
Soft blue clay.....	265-	350
Soft gray sandstone.....	350-	356
Soft blue clay.....	356-	366
Soft gray sandstone.....	366-	371
Soft blue clay.....	371-	494
Soft brown sandstone; small show of oil and gas; landed 8-inch drive pipe at 507 feet.....	494-	529
Soft blue clay.....	529-	584
Hard gray sandstone.....	584-	592
Hard blue clay.....	592-	602
Hard blue sandstone.....	602-	639
Very fine and hard gray sandstone.....	639-	659
Hard dark shelly sandstone.....	659-	674
Hard blue sandy clay.....	674-	704
Hard sandstone, dark pebbles.....	704-	739
Soft light-blue sandstone.....	739-	754
Hard sandstone.....	754-	760
Soft blue sandy clay.....	760-	811
Soft blue clay with coarse sand.....	811-	835
Soft blue clay.....	835-	915
Dark open sandstone.....	915-	935
Dark-brown sticky clay.....	935-	975
Soft white limestone, Austin chalk.....	975-	1,000

No oil or gas found in paying quantity. The 10-inch drive pipe was left in the well and the sandstone at 227 to 228 feet furnishes about $2\frac{1}{2}$ gallons of soft water per minute by pumping. Well mouth is about 1,000 feet above sea level.

1704. Well near Corsicana, Navarro County.

[Well begun July 30, 1905; completed August 10, 1905. Authority, F. C. Smith, superintendent Corsicana Petroleum Company, owner. Samples preserved. Log compiled from samples by S. Sanford.]

This is the log of a well 5 miles east of Corsicana, in the Powell or heavy-oil field. As a rotary rig was used, the samples are not so representative as those obtained by standard rigs; still, changes in the formations are shown and as the samples apparently were carefully saved the log has more value than if it simply recorded the driller's impressions. The oil-bearing sands are found in blue or dark-gray clay shales—the Taylor marl—which form part of the Upper Cretaceous series.

Record of well No. 22 on B. T. Barry farm, 5 miles east of Corsicana.

	Feet.
Dark-gray, almost black sandy clay and brown limy clay	0- 20
Brown sandy and limy shale	20- 60
Gray and dark-gray shale	60- 80
Soft gray shale	80-100
Soft brownish limy shale	100-120
Dark-gray shale with soft limy streaks	120-140
Dark-gray, more or less limy shale	140-240
Soft dark-brownish, slightly limy and sandy shale	240-280
Dark-gray limy shale	280-340
Dark-brownish, slightly limy shale with streaks of hard red shaly sandstone below 360 feet	340-380
Dark-gray limy shale	380-440
Brownish shale with limy streaks, the latter often dark gray	440-480
Dark-gray shale with limy streaks	480-500
Dark-greenish, slightly limy shale, fossiliferous at 520 to 540 feet	500-560
Dark-gray shale	560-580
Dark-gray, slightly brownish shale, a little limy	580-640
Dark shale with greenish or brownish tints, sample more limy than most of those preceding	640-660
Dark shale, harder and less limy	660-680
Dark-greenish shale, more limy than preceding	680-700
Dark-greenish sandy shale	700-720
Dark greenish-brown limy sandstone	720-780

Driller reported thin layers of rock from 90 to 350 feet at close intervals. Rig used, rotary. Depth of well, 810 feet. Diameter, 6½ inches from 0 to 65 feet; 4 inches from 65 to 720 feet. Strainer from 710 to 810 feet. Initial yield of oil, 10 barrels in twenty-four hours. Quality, 30° to 31° B.

1706. Well near Corsicana, Navarro County.

[Well begun January 1, 1905; completed February 20, 1905. Authority, R. C. Sanders, contractor. Samples preserved.]

The formations penetrated by this well are of Upper Cretaceous age, the Navarro and Taylor marls, with perhaps an overlying thin layer of Tertiary sands.

Record of well No. 1 on Hodge farm, 12 miles northeast of Corsicana.

	Feet.
Soft, fine white and brownish sand	0 - 10
Dark clay and fine dark-gray sand	10 - 30
Blue clay with fragments of shells	30 - 50
Soft dark clay	50 - 70
Hard dark sand	70 - 100
Soft dark-bluish shale and clay	100 - 754
Sand; gas	754 - 891½
Soft dark-bluish shale and clay	891½ - 964
Sand; gas	964 - 985
Soft dark-bluish shale	985 - 1,000
Sand; gas	1,000 - 1,129

Rig used, rotary. Diameter of well, 6½ inches from 0 to 100 feet; 4 inches from 0 to 1,129 feet. Dry hole.

1708. Well 15 miles west of Corpus Christi, Nueces County.

[Well begun November 17, 1904; completed January 4, 1905. Authority, Thomas Fowler, driller.]

This is the log of a well drilled for water in the southwestern portion of the Gulf Coastal Plain of Texas. Comparatively few well records from that section have been published and as this log was apparently kept with care it is of interest.

The formations penetrated below 132 feet are thought to be of Pliocene (late Tertiary) age and may include beds corresponding to the Reynosa limestone, which outcrops for a long distance in eastern McMullen and Duval counties, and also a few miles west of Corpus Christi. The overlying clays and sands may be the equivalent of the Port Hudson (Quaternary) of Mississippi. Below the Reynosa limestone are the Fayette sands (Eocene).

Record of well 15 miles west of Corpus Christi.

	Feet.
Black waxy soil	0- 4
Soft gray sand	4- 12
Soft light-gray clay	12-108
Sand and gravel	108-126
Hard blue clay	126-132
Soft light-gray clay and sand	132-157
Hard pinkish clay	157-165
Soft limestone	165-168
Medium-soft pink, blue, and gray clay	168-206
White sand; salt bearing	206-212
Gravel	212-217
Tough, sticky white clay	217-246
Varicolored clay	246-266
Soft brownish rock	266-271
Hard clay	271-278
Fine gray sand	278-292
Fine pinkish sand and clay	292-307
Yellow clay	307-312
Soft varicolored clay	312-324
Blue clay	324-330
Soft white rock formation	330-334
Soft yellow and light clay and sand, mostly clay	334-365
Soft rock formation	365-373
Soft sand and clay	373-393
Rock and clay in layers	393-436
Tough pink clay	436-472
Hard gray rock	472-475
Soft ash-colored clay with some sand	475-482
Hard brown clay	482-507
Soft rock and sand	507-510
Tough clay	510-527
Soft gray clay	527-534
Hard yellow clay	534-566
Brownish clay with strata of sand and rock	566-600
Hard gray rock	600-604
Soft blue and pink clay	604-624
Medium-coarse brownish-gray sand; water-bearing	624-656

Rig used, rotary and jet. Diameter of well, 7 inches. Casing used, 629 feet of 5 $\frac{3}{8}$ -inch; strainer from 629 to 645 feet. Main supply of water from 630 to 645 feet. Well pumps 25 gallons per minute.

1712. Well at Weatherford, Parker County.

[Well completed in 1903. Authority, S. O. Newton, manager Weatherford Water, Light and Ice Company, owner. No samples. Geologic correlations checked by A. C. Veatch.]

The log given beneath is that of an 8-inch well drilled by the company in 1896. A slightly different log of one of the company's wells is given by R. T. Hill.^a The rocks are of Lower Cretaceous age. The formations, in downward order, are Paluxy, Glen Rose, and Trinity.

Record of well on corner of West Lee avenue and Davis street, Weatherford.

	Feet.
Brownish clay and sand	0- 30
Bluish clay	30- 50
Paluxy:	
Pack sand; water-bearing	50- 60
Glen Rose:	
Bluish shale with streaks of hard limestone or sandstone	60- 90
Bluish shale	90-120
Blue shale, limestone, and brownish pack sand	120-150
Pack sand and bluish shelly limestone	150-180
Limestone, rotten from 240 to 270 feet, hard from 300 to 390 feet	180-390
Sandy shale and gravel; water from 402 to 425 feet	390-420
Trinity:	
Sandy shale	420-450
Red clay	450

The company has three wells—10-inch, 8-inch, and 6-inch from top to bottom. Water stands at 310 feet below surface and is lowered to 323 feet by pumping full capacity of pumps. Quality of water, hard. Temperature at well mouth, 68°.

1716. Well 10 miles southwest of Miami, Roberts County.

[Well begun September 20, 1904; completed January 1, 1905. Authority, G. L. Chisum. No samples.]

Roberts County is in what is known as the high-plains region of northern Texas, where the ground water often lies at a considerable depth. The formations penetrated by this well are thought to be of Tertiary age. The well is typical of others in the region near Miami.

Record of well 10 miles southwest of Miami.

	Feet.
Red clay	0- 60
Lime rock (may be chalky clay)	60- 90
Clay and gravel	90-120
Clay and sand	120-240
Sand; water at 330 feet	240-422

Rig used, cable. Casing used, 422 feet of 5½-inch. Water at 330 feet did not rise when struck. It is not lowered by pumping 10 gallons per minute. Mr. Chisum says, "The amount obtained depends on the size of pump used." Quality of water, soft.

1765. Well near Taylor, Williamson County.

[Well begun May 15, 1903; completed August 21, 1903. Authority, J. Maresh, contractor and driller. No samples.]

This deep well started near the dividing line between the Cretaceous and Eocene formations. The rocks penetrated are of Upper Cretaceous age and include the Webberville formation, Taylor marl, and Austin chalk.

^a Geography and geology of the Black and Grand prairies; Twenty-first Ann. Rep. U. S. Geol. Survey, pt. 7, 1901, p. 456.

Record of well on Charles E. Stauffer farm, 8 miles east of Taylor.

	Feet.
Black soil.....	0- 10
Gravel; water-bearing.....	10- 13
Soft shale or clay mixed with oyster shells.....	13- 980
Hard rock, with gravel.....	980-1,235
Soft blue clay.....	1,235-1,275
Hard rock, with gravel and oyster shells.....	1,275-1,500

Rig used, rotary. Diameter of well, 5 inches from top to bottom. No water found except the top seep at 13 feet.

1766. Well in Zavalla County.

[Well begun February 15, 1904; completed April 1, 1905. Authority, E. A. Archibald, contractor and driller. No samples.]

This flowing well, 22 miles north of Carrizo Springs, was obtained by drilling through a water-bearing sandstone, that may be of Eocene age and form part of the Myrick formation.

Record of well 6 miles north of county line and 4 miles west of Nueces River.

	Feet.
Blue clay formation, hard and slakes when touched with water; dry, "all colors, and no two feet alike".....	0 -550
Sand—water-bearing; water rose within 20 feet of surface.....	550 -570
Clay and thin layers of rock; "a foot of rock, a foot of clay, 2 feet of rock, etc.".....	570 -650
Sandstone—water-bearing; flow 5 gallons per minute.....	650 -675
Rock and clay.....	675 -715
Iron pyrite.....	715 -716½
Coarse light sandstone.....	716½ -796
Blue rock.....	796 -810
Coarse gray sandstone.....	810 -905
Gray clay, hard and dry, caving off by chunks, a little rock on top of the clay..	905 -910

Rig used, cable. Casing used, 720 feet of 8-inch. Principal water bed at 720 feet. Static head of flow, $+2\frac{1}{2}$ feet. Well has to be pumped to start flow and flow can be stopped by lowering the sand bucket in the well. Pumping 100 gallons per minute depresses water 15 feet. Quality of water, slightly sulphuretted. Temperature, 90° F. Elevation of well mouth, 60 feet above Nueces River.

UTAH.**1767. Well at Salt Lake City, Salt Lake County.**

[Well begun June 23, 1905; completed July 7, 1905. Authority, Frank Yeager, contractor and driller. No samples.]

This well gives a characteristic section of the alternating beds of clay, sand, and gravel that were deposited in Pleistocene time in Lake Bonneville, a great sheet of prevalingly fresh water that occupied Salt Lake Valley. Salt Lake is a remnant of Lake Bonneville. The water-bearing sands and gravels of the old lake bed lie in lenticular bodies of varying extent, so that logs of near-by wells often differ decidedly and there are no definite water-bearing horizons. One well may pass through several water-bearing sands and another just as deep a short distance away may not find more than half the number. The character of the lake beds and the supplies of water they may yield are described in Water-Supply and Irrigation Paper No. 157, "Underground waters of the valleys of Utah Lake and Jordan River," by G. B. Richardson.

Record of well at Salt Lake City.

	Feet.
Soil.....	0- 8
Blue clay.....	22- 62
Dark blue clay.....	62- 97

	Feet.
Red clay.....	97-117
Gravel; small flow.....	117-119
Blue clay.....	119-131
Gravel; small flow, 3 gallons per minute.....	131-143
Blue clay.....	143-156
Gravel; small flow.....	156-170
Red clay with thin strata of red sand.....	170-218
Gravel.....	218-222
Red clay.....	222-290
Blue clay.....	290-337
Sand and gravel.....	337-347
Blue clay.....	347-367
Gray clay.....	367-428
Red clay with thin strata of red sand.....	428-542
Sand and gravel; blasted pipe at this point with half a stick of 40 per cent dynamite.....	542-548
Blue clay.....	548-603
Quicksand.....	603-611
Gravel.....	611-613
Red clay; blasted pipe at this point with one-half stick of 40 per cent dynamite.....	613-617
Gravel.....	617-623
Red clay and sand; blasted pipe at this point with one-half stick of 40 per cent dynamite.....	623-635
Gravel.....	635-642
Blue clay.....	642-650

Rig used, jet. Diameter of well, 3 inches. Length of casing, 638 feet. Well flows 50 gallons of water per minute; static head, +30 feet.

WASHINGTON.

1782. Well near Carley, Benton County.

[Well completed in 1905. Authority, S. L. Gaines, owner. Incomplete series of samples preserved.]

This well, according to the owner, was drilled between two others, one flowing about 200 gallons per minute with little pressure, the other 400 gallons with a closed pressure of 33 pounds per square inch. It was drilled to 280 feet on a flow-or-no-pay contract. As the log shows, no flow was found by going deeper. The formations are of undetermined age. The clay and sand down to 250 feet may correspond to the Ellensburg formation farther north and the basalt below to the Yakima basalt (Miocene).

Record of well in the SE. $\frac{1}{4}$ sec. 6, T. 4, R. 24; $1\frac{1}{4}$ miles northeast of Carley.

	Feet.
Dark soil.....	0- 3
Clay, sand, and gravel with water.....	3- 70
Dark-gray, micaceous sand or sandstone.....	70- 80
Soft brownish shale or clay.....	80-250
Brown, sandy shale or clay and basalt.....	250-280
Basalt.....	280-415
Honeycomb (or scoriaceous) basalt; water-bearing.....	415-432

Rig used, cable. Casing used, 64 feet of 8-inch; 209 feet of 6 $\frac{1}{8}$ -inch; 814 feet of 4-inch. The 8-inch and 4-inch were pulled. When the "honeycomb" rock was struck the water in the well fell from 33 $\frac{1}{2}$ feet below surface to 38 feet and the flow through the rock was so free that all drillings were washed away. Quality of water, soft. Elevation of well mouth, 50 feet above Columbia River, about 280 feet above sea.

1797. Well at Fort Flagler, Jefferson County.

[Well begun June 15, 1900; completed May 8, 1903. Authority, Capt. George H. Penrose, constructing quartermaster. No samples.]

Fort Flagler is in the northeast corner of Jefferson County, on a point of land projecting into Admiralty Inlet, the entrance to Puget Sound. The well is about 300 feet from the inlet. The surface materials are clay and sand of glacial origin, and the log shows the great depth of the deposits. The underlying bed rock is of Tertiary age.

Record of well at Fort Flagler.

	Feet.
Clay.....	0- 4
Sand, bottom of 4- by 6-foot pit at 32 feet.....	4- 60
Hardpan.....	60- 64
Coarse sand with salt water.....	64- 123
Fine blue sand.....	123- 130
Hardpan clay.....	130- 156
Coarse sand with salt water.....	156- 160
Blue clay.....	160- 164
Sand and gravel with salt water.....	164- 178
Clay.....	178- 183
Sand and gravel with salt water.....	183- 186
Sandy clay; end of 8-inch casing at 188 feet.....	186- 188
Fine blue sand.....	188- 217
Blue clay.....	217- 412
Hardpan clay.....	412- 420
Fine-grained, smooth blue clay; end of 6-inch casing at 560 feet.....	420- 663
Hardpan and gravel.....	663- 666
Hardpan and boulders.....	666- 673
Boulders, gravel, and quicksand.....	673- 703
Hardpan and gravel.....	703- 721
Blue clay.....	721- 735
Clay, gravel, and sand.....	735- 746
Hardpan, 14 feet; hard clay with gravel, 19 feet.....	746- 765
Fine sand and gravel.....	765- 770
Blue clay.....	770- 874
"Soapstone clay".....	874- 900
Blue clay.....	900-1, 150
Cement clay.....	1, 150-1, 165
Fine sand.....	1, 165-1, 171
Hard sandy clay with boulders at bottom.....	1, 171-1, 260
Sandy clay.....	1, 260-1, 312
Sand with pieces of wood.....	1, 312-1, 314
Sandy clay with pebbles.....	1, 314-1, 390
Sandy cement clay.....	1, 390-1, 448
Quicksand containing water.....	1, 448-1, 456
Very hard sandy clay; end of 4½-inch casing at 1,458 feet.....	1, 456-1, 462½

Water in quicksand at 1,448 to 1,456 feet rises to about 60 feet below surface. It is fresh and enters well at the rate of about 1 gallon per minute.

1800. Well 16 miles northwest of Walla Walla, Wallawalla County.

[Well begun October 19, 1905; completed November 27, 1905. Authority, W. S. McCausland, contractor and driller. Samples preserved.]

This well is typical of some that obtain water from porous strata or from crevices in the lava beds of Miocene age that underlie a great area in central and southern Washington.

Record of well in the SE. $\frac{1}{4}$ sec. 2, T. 8, R. 34.

	Feet.
Brown soil and sand.....	0- 35
Medium-coarse quartz sand and bits of igneous rock.....	35- 40
Hard black rock.....	40-140
Hard dark igneous rock; may be basalt.....	140-156
Hard dark rock, much like preceding.....	156-166
Hard dark massive igneous rock.....	166-335
Softer dark igneous rock, fine grained or glassy.....	335-350

Driller's log says: "Hard lava rock, 40 to 340 feet; softer lava rock, 340 to 350 feet."

Rig used, cable. Casing used, 40 feet of 5 $\frac{3}{8}$ -inch. "A small seep of water was found at 60 feet and perhaps others below, but all were insufficient. At 340 feet the water rose 90 feet; pumping 10 gallons per minute lowered it 10 feet."

WEST VIRGINIA.**1801. Well near Culloden, Cabell County.**

[Well begun in May, 1905; completed in July, 1905. Authority, J. G. Weller, of Weller Brothers, contractors. Samples preserved. Geologic correlations by R. W. Stone.]

This well, in the gas and oil field east of Milton, apparently starts a little below the Pittsburgh coal. It passes through the Conemaugh, Allegheny, and Pottsville formations (Pennsylvanian); and the Mauch Chunk, ending below the bottom of the Pocono (Mississippian). The coal seams penetrated are identified provisionally.

Record of well in Grant Township, 2 miles south of Culloden.

	Feet.
Soil and subsoil.....	0 - 22
Conemaugh:	
Light-gray limy shale.....	22 - 45
Light-gray limy shale and dark-gray sandy shale.....	45 - 65
Gray limy sandstone; fresh water.....	65 - 100
Gray shale.....	100 - 110
Red rock (brownish limy shale).....	110 - 135
Light-gray limy shale and greenish-gray sandy shale.....	135 - 155
Gray sandstone.....	155 - 160
Red and white shale.....	160 - 171
Greenish-gray shale, more or less gritty.....	171 - 250
Gray shale.....	250 - 280
Gray limy sandstone.....	280 - 305
Gray limy sandstone and a layer of dark-gray sandy shale.....	305 - 335
Gray and reddish limy sandstone.....	335 - 340
Dark shaly sandstone.....	340 - 345
Gray sandstone and sandy shale.....	345 - 365
Gray limy sandstone; salt water, 40 gallons per hour.....	365 - 405
Gray sandstone, "sand broken and slaty 445 to 447 feet".....	405 - 467
Gray sandstone and black shale.....	467 - 473
Gray and dark-gray to black sandy shale.....	473 - 479

Allegheny:

Feet.

Dark-gray to black sandy shale; coal at 485 feet, thin seam (Upper Freeport).....	479 - 485
Gray and dark-gray sandy shale.....	485 - 505
Hard gray sandstone.....	505 - 630
Gray sandy shale and black shale.....	630 - 650
Gray and black shale.....	650 - 670
Gray sandy shale; show of coal (?) (Kittanning).....	670 - 680
Hard gray limy sandstone.....	680 - 725
Black slate (brownish limestone).....	725 - 745
Black slate and shells (dark limy shale).....	745 - 785
Black slate and shells (dark and light gray sandy shale).....	785 - 825
Hard gray limy sandstone with dark sandy shale below 845 feet.....	825 - 870
Hard gray limy sandy shale.....	870 - 890
Black shale with showing of coal.....	890 - 930

Pottsville:

Light-buff to reddish or brownish sandstone, Salt sand.....	930 -1, 050
Gray gritty shale.....	1, 050 -1, 053
Gray clayey sandstone.....	1, 053 -1, 073
Light-buff sandstone and dark-gray sandy shale.....	1, 073 -1, 093
Gray sandy shale.....	1, 093 -1, 100
Light-buff sandstone.....	1, 100 -1, 120
Brownish-gray sandstone and dark-gray sandy shale.....	1, 120 -1, 125
Hard light-buff to brown sandstone.....	1, 125 -1, 185
Hard buff sandstone.....	1, 185 -1, 215
Coal, and dark sandstone.....	1, 215 -1, 216
Black gritty shale.....	1, 216 -1, 235
Hard white to brownish and gray shale.....	1, 235 -1, 285
Gray shale.....	1, 285 -1, 286
Hard white to brownish sandstone; bottom of Salt sand at 1,344½ feet.....	1, 286 -1, 344½

Greenbrier limestone:

Brownish limestone and dark-gray sandy shale; top of Big Lime at 1,365 feet.....	1, 344½ -1, 365
Gray and brownish limestone; gas at 1,396 to 1,416 feet, about 261,000 cubic feet in twenty-four hours.....	1, 365 -1, 436
Brown limy sandstone.....	1, 436 -1, 456
Brown limestone; slight show of oil; bottom of Big Lime.....	1, 456 -1, 509
Brownish limestone and gray sandy shale.....	1, 509 -1, 519

Pocono:

Gray and brownish sandy shale.....	1, 519 -1, 535
Gray sandstone and sandy shale, Keener sand.....	1, 535 -1, 565
Gray sandstone and dark-gray sandy shale.....	1, 565 -1, 590
White to gray, slightly limy sandstone and black shale, top of Big Injun; about 15 gallons of salt water per hour.....	1, 590 -1, 610
Hard, coarse white to gray sandstone to 1,630 feet; fine brownish limy sandstone to 1,650 feet; gray sandstone and dark-gray sandy shale; bottom of Big Injun, 1,650 to 1,655 feet.....	1, 610 -1, 655
Black sandy shale.....	1, 655 -1, 660
White sandstone.....	1, 660 -1, 670
Slate and shells (gray limy shale).....	1, 670 -1, 700
Slate and shells (gray sandy and slightly limy shale).....	1, 700 -1, 730
Slate and shells (dark shale, limy below 1,770 feet).....	1, 730 -1, 800
Dark and light brownish limy shale.....	1, 800 -1, 830
Dark and light brownish sandy shale.....	1, 830 -1, 875

Pocono—Continued.

	Feet.
Dark-brownish limy shale.....	1, 875 -1, 905
Dark limy and sandy shale.....	1, 905 -1, 940
Dark shale with limy streaks.....	1, 940 -1, 980
Gray and brown shale with limy streaks.....	1, 980 -2, 080
Black shale.....	2, 080 -2, 100
Gray limy sandstone and dark-gray sandy shale, Berea sand, top at 2,100 feet.....	2, 100 -2, 110
Gray to brown limy sandstone; gas, estimated at 1,000,000 feet in twenty-four hours; bottom of Berea sand at 2,125 feet.....	2, 110 -2, 128

Rig used, standard. Diameter of well, 13 inches from 0 to 171 feet; 10 inches from 171 to 1,344½ feet; 8 inches from 1,344½ to 1,675½ feet; and 6½ inches to bottom. Three strings of casing used—10-inch, 8-inch, and 6½-inch.

The gas from the limestone at 1,396 feet, initial flow 261,000 cubic feet, and pressure 400 pounds, was cased off and used for fuel in drilling deeper. Salt water was found at 385 to 405, 940 to 1,344½, and 1,590 to 1,610 feet. At 940 feet well filled with salt water in two hours; estimated inflow, 1,000 barrels in twenty-four hours. Steel-line measurements taken to gas at 1,396 feet, to limestone at 1,519 feet; to bottom of 6½-inch casing at 1,675½ feet, to top of Berea at 2,100 feet, to bottom of Berea at 2,125 feet, and to bottom of hole 2,128 feet. Sand at 2,100 feet shot with 40 quarts of nitroglycerin with good results. Well tubed and shut in.

1803. Well near Bridgeport, Harrison County.

[Well begun June 22, 1904; completed January 11, 1905. Authority, Hope Natural Gas Company, owner. No samples. Geologic correlations by R. W. Stone.]

No record has been published from Harrison County, and few from the State, of a well going deeper below the Pittsburg coal than this. The Wheeling well (4,500 feet), the deepest in the State, went 4,170 feet below the Pittsburg. In the "lime, sand, and shells" from 3,000 to 3,280 feet may be the Speechley sand of Pennsylvania. The Bayard or Sixth sand, regarded as the basal member of the Catskill beds by the West Virginia Survey, does not seem to have been noticed. It lies 2,410 feet below the Pittsburg coal in Marion County and, on the average, 2,433 feet in eastern Greene County, Pa. This well, starting just above the Pittsburg coal, the bottom of which marks the top of the Conemaugh formation of the Pennsylvanian series, passed through the Conemaugh and also the Allegheny and Pottsville formations of the Pennsylvanian, the Mauch Chunk and Pocono of the Mississippian, and then into the Devonian rocks below the Carboniferous, through the "Venango oil group" sands of the Pocono-Catskill group and into the Chemung.

Record of well on George Lancaster farm, 3 miles southeast of Bridgeport.

	Feet.
Pittsburg coal.....	42- 48
Dunkard sand.....	568- 600
Gas sand.....	675- 710
Salt sand (Maxton).....	1, 030-1, 090
Big Lime.....	1, 270-1, 340
Big Injun.....	1, 340-1, 480
50-foot sand (Squaw?).....	1, 778-1, 820
Stray sand.....	2, 020-2, 045
Gordon sand (Nineveh?).....	2, 070-2, 085
Fifth sand.....	2, 355-2, 375
Lime and shells.....	2, 500-3, 000
Lime, sand, and shells.....	3, 000-3, 280
Sand; salt water at 3,295 feet.....	3, 285-3, 310
Black slate.....	3, 310-3, 320
Hard lime.....	3, 320-3, 340
Black slate.....	3, 340-3, 371

Casing used, 270 feet of 10-inch; 1,400 feet of 8½-inch. Dry hole.

1806. Well near Farmington, Marion County.

[Well begun July 11, 1905; completed September 13, 1905. Authority, Fayette County Gas Company, owner. No samples. Geologic correlations by R. W. Stone.]

This skeleton log of a big gas well in the Mannington pool shows the depths to the various sands. The well started in the Permian (?) series of the Carboniferous and the pay sands are in the "Catskill" formation of the Devonian. The well consequently penetrated the Permian, Monongahela, Conemaugh, and Allegheny formations (Pennsylvanian) and Maunch Chunk and Pocono formations (Mississippian) of the Carboniferous and entered the Devonian.

Record of well No. 1 on Sarah A. Town farm, 2 miles north of Farmington.

	Feet.
Conductor.....	16
Pennsylvanian:	
Mapletown (Sewickley) coal.....	371- 378
Pittsburg coal.....	488- 499
Dunkard sand.....	1, 115-1, 150
Gas sand.....	1, 302-1, 345
Salt sand.....	1, 420-1, 520
Maunch Chunk:	
Pencil Cave.....	1, 730-1, 738
Big Lime.....	1, 738-1, 814
Pocono:	
Big Injun sand; gas at 1,890 and 1,915 feet.....	1, 814-1, 935
Sand.....	2, 250-2, 262
Fifty-foot sand; gas at 2,340 feet.....	2, 335-2, 350
Pocono or Catskill (?):	
Gantz sand (?).....	2, 378-2, 440
Sand.....	2, 466-2, 475
Stray sand.....	2, 480-2, 490
Gordon sand (?).....	2, 495-2, 515
Catskill:	
Fourth sand (?).....	2, 698-2, 740
Fifth sand; gas.....	2, 857-2, 878

Casing used, 515 feet of 10-inch; 1,478 feet of 8 $\frac{1}{2}$ -inch; 1,820 feet of 6 $\frac{3}{8}$ -inch; 2,858 feet of 4-inch tubing. The big pay was in the Fifth sand at 2,858 feet. When shut in by the 4-inch tubing it showed good, after blowing open four days, for a little more than 16,000,000 cubic feet in twenty-four hours. Initial rock pressure, 760 pounds per square inch; minute pressure, 575 pounds. The other pays showed good for about 2,000,000 feet.

"The Dunkard sand seems to be near the horizon of the Freeport, while the Fifty-foot, Gantz, Gordon, and Fourth are all misnamed, although the Fifth sand seems to be at its proper horizon. These intervals do not fall in the proper place, as determined by the averages of many records in Pennsylvania. Furthermore, the Gantz has been described as above the Fifty-foot rather than below it."—R. W. Stone.

1810. Well in Monongalia County.

[Well completed in 1905. Authority, South Penn Oil Company, owner. No samples. Geologic correlations by R. W. Stone.]

Oil has been found at greater depth in this well than in any other of which the Survey has record. It is believed to be the deepest producing oil well in the world. The log gives little more than the depth and thickness of the various sands. The formations penetrated range in age from Permian (?) to Devonian and should include these: Dunkard group (Permian), Monongahela, Conemaugh, Allegheny, and Pottsville formations (Pennsylvanian), Mauch Chunk, and Pocono, including Big Injun (Mississippian), and oil-bearing sands, including those below the Fifty-foot, of "Catskill" age (Devonian).

Record of well No. 11 on Wilson heirs' farm.

	Feet.
Conductor.....	0- 16
Pennsylvanian:	
Mapletown coal.....	1, 138-1, 142
Pittsburg coal, steel-line measure.....	1, 228
Big Dunkard.....	1, 728-1, 760
Gas sand.....	1, 920-1, 980
Salt sand; water at 2,144 feet.....	2, 138-2, 230
Mauch Chunk:	
Pencil Cave.....	2, 452-2, 458
Big Lime.....	2, 458-2, 512
Pocono:	
Big Injun; show of oil at 2,625 feet.....	2, 512-2, 725
Fifty-foot sand; show of oil at 3,131 feet, steel-line measure.....	3, 110-3, 232
Catskill:	
Gordon Stray.....	3, 418-3, 430
Gordon.....	3, 438-3, 453
Shell, lined at 3,630 feet.....	3, 627-3, 632
Fifth sand, steel-line measure.....	3, 643
Oil, steel-line measure.....	3, 645
Bottom of well.....	3, 658

Initial yield of oil, 12 barrels in twenty-four hours.

1813. Well near Dunlow, Wayne County.

[Well begun November 1, 1904; completed January 20, 1905. Authority, F. S. Weiler of Weiler Bros., contractors. Samples preserved. Samples compared with log by E. F. Lines. Geologic correlations by R. W. Stone.]

This well in southern Wayne County, starting in the Conemaugh formation, goes through the underlying Allegheny and Pottsville formations (Pennsylvanian) and stops in the Mauch Chunk formation (Mississippian) near the bottom of the Big lime.

Record of well No. 1 on James Napier farm, three-fourths mile north of Dunlow.

	Feet.
White quicksand; surface of fresh water stands 18 feet below top of hole....	0- 40
Soft black sand and clay; 60 feet of 13-inch drive pipe.....	40- 60
Conemaugh:	
Medium-hard gray sandstone.....	60- 120
Soft gray shelly sand, with slate breaks cased at 132 feet to shut off fresh water.....	120- 160
Medium-hard white sandstone, water bearing; water somewhat salty and containing sulphur gas enough to light and burn at hole; about 1 barrel an hour of water.....	160- 175
Allegheny:	
Black sand, shale, and coal.....	175- 180
Soft white sandstone.....	180- 220
Gray shale, soft and sticky.....	220- 240
Soft black shale.....	240- 260
Hard gray sandstone.....	260- 280
Coal.....	280- 285
Soft black shale; traces of coal at 305-325 feet.....	285- 385
Hard black shale and lime.....	385- 400
Hard gray limestone; cased at 405 feet with 8½-inch casing.....	400- 410
Soft black shale.....	410- 450
Medium-hard black and white sand and slate shells.....	450- 465

Pottsville:

Feet.

Hard light-gray, dark-gray, and white sandstone—traces of salt water at 510–530 feet; 4 barrels salt water in twenty-four hours at 550–570 feet; show of oil and more water at 590–600 feet; hole filled with water 250 feet in thirty minutes at 610 feet; hole filled full at 620 feet; coal break at 620 feet; shale break too thin to measure at 660 feet; slate break about 2 feet thick at 812 feet; slate too thin to measure at 880 feet; bottom of Salt sand at 935 feet..... 465– 935

Greenbrier limestone:

Hard black shale and limestone; slate break between Salt sand and Mountain lime..... 935– 942
 Hard black limestone; Big or Mountain lime..... 942– 960
 Hard gray limestone with thin slate, too thin to record..... 960– 978
 Hard gray limestone; slate break at 980 feet..... 978– 984
 Hard white limestone; small showing of gas at 1,084–1,094 feet, would burn up 5 feet out of 6½-inch hole, estimated at 100,000 cubic feet in twenty-four hours..... 984–1, 144
 Hard dark gray limestone; showing of oil at 1,150–1,162 feet..... 1, 144–1, 172

Rig used, standard. Diameter of well, 13 inches from 0 to 132 feet; 10 inches from 132 to 405 feet; 8¼ inches from 405 to 942 feet; 6½ inches from 942 to 1,172 feet. Casing used, 132 feet of 10-inch; 405 feet of 8¼-inch; 942 feet of 6½-inch.

1815. Well at Far, Wetzel County.

[Well begun April 10, 1905; completed June 5, 1905. Authority, T. L. Dunlap, driller. No samples. Geologic correlations by R. W. Stone.]

This well started in the Washington formation (Permian) and went down through the Monongahela, Conemaugh, Allegheny, and Pottsville formations (Pennsylvanian), and Mauch Chunk and Pocono (Mississippian) of the Carboniferous system into the sands and slates of the Upper Devonian, the so-called Catskill formation. The coal at 275 feet is the Washington, which lies from 435 to 510 feet above the Pittsburg; according to well records published by the West Virginia Survey.

Well No. 1 on Windham farm, 1 mile south of Far.

Washington:

Feet.

Soft white slate..... 0– 50
 Hard white lime..... 50– 120
 Soft white slate..... 120– 162
 Hard white lime..... 162– 250
 Soft white slate..... 250– 275
 Coal (Washington)..... 275– 280
 Hard white lime..... 280– 500

Monongahela:

White slate..... 500– 640
 Mapletown (or Sewickley) coal..... 640– 646
 Hard white lime..... 646– 700
 Soft black slate..... 700– 715
 Pittsburg coal..... 715– 720

Conemaugh:

Hard black lime..... 720–1, 050
 Soft red rock..... 1, 050–1, 100
 Soft sand, Little Dunkard..... 1, 100–1, 150
 Soft black slate..... 1, 150–1, 185
 Big Dunkard..... 1, 185–1, 235
 Soft white sand, gas sand..... 1, 235–1, 260

Allegheny:	Feet.
Soft white slate.....	1,260-1,390
Hard white sand.....	1,390-1,425
Soft black slate.....	1,425-1,550
Pottsville:	
Hard sand, Salt sand.....	1,550-1,580
Soft white slate.....	1,580-1,670
Hard white sand; salt water at 1,690 feet.....	1,670-1,775
Mauch Chunk:	
Soft white slate.....	1,775-1,860
Hard lime, Little Lime.....	1,860-1,885
Pencil Cave, soft.....	1,885-1,895
Blue Monday, hard.....	1,895-1,909
Hard white lime, Big Lime.....	1,909-1,980
Pocono:	
Hard white sand, Big Injun.....	1,980-2,210
Soft white slate.....	2,210-2,560
Pocono or Catskill (?):	
Hard sand, Fifty-foot.....	2,560-2,600
Soft white slate.....	2,600-2,780
Catskill:	
Hard sand, Stray sand.....	2,780-2,795
Hard white sand, Gordon.....	2,795-2,820

Diameter, 13 inches from 0 to 162 feet; 10 inches from 162 to 1,195 feet; 8 inches from 1,195 to 1,909 feet; 6½ inches from 1,909 to 2,310 feet. Gas struck in Gordon sand. Rock pressure, 800 pounds. Casing used, 162 feet of 10-inch; 1,195 feet of 8-inch; 1,909 feet of 6½-inch; 2,310 feet of 5-inch.

WISCONSIN.

1826. Well near Manitowoc, Manitowoc County.

[Well begun in May, 1905; completed in August, 1905. Authority, William Weber, driller. Samples preserved. Geologic correlations by E. O. Ulrich.]

Deep wells near Manitowoc obtain water from several formations. This one tapped the Niagara limestone. The formations are the drift (Pleistocene); Niagara limestone and Clinton iron ore (Silurian), and Maquoketa shale (Ordovician).

Record of well of Northern Grain Company, in sec. 31, T. 19, R. 24.

Drift:	Feet.
Yellow sand.....	3- 6
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Rig used, pole tools. Diameter of well, 10 inches from surface to 150 feet; 7 inches from 150 to 400 feet. Casing used, 113 feet. Well yields by pumping 350 gallons per minute.

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