

CARNEGIE INSTITUTE OF TECHNOLOGY

COLLEGE OF ENGINEERING

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF Engineer of Mines

SUBJECT Analytical Study of the Development of Production
for The Peoples Natural Gas Company from 1885 to 1938.

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DEPARTMENT OF Mining CLASS OF 1928

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SYNOPSIS

The study embraces a general statement of the History of Oil and Gas development since the products of these developments were first known to man. It includes a description of the Geological conditions favorable to the accumulation of Oil and Gas in Pennsylvania.

The operations dealing with the development of production for the Peoples Natural Gas Company were studied in detail and described by periods with an analysis of all the factors such as exploration, acquisition of acreage, source of the product, including the sands developed and the required depths of wells. The effect of market requirements on the sources of supply and acceleration of development is analyzed and described in detail.

From a study of the past operating conditions forecasts have been made as to future requirements and the kind and amount of developments that will be needed to fulfill the future demands. The little understood problem of acreage requirements is studied in detail, and an attempt is made to place this important factor of production on a scientific basis whereby present holdings of acreage may be gauged to fulfill the future requirements of anticipated market demands for Natural Gas.

In a similar manner the amount and cost of the drilling developments of the future have been reduced to a scientific basis and appropriate forecasts have been made.

ANALYTICAL STUDY OF THE
DEVELOPMENT OF PRODUCTION FOR
THE PEOPLES NATURAL GAS
COMPANY FROM 1885 to 1938

- GENERAL HISTORICAL STATEMENT -

HISTORICAL REPORT OF THE PEOPLES NATURAL GAS COMPANY

General Historical Statement:

Occurrences of Oil and Gas have been recorded since the beginning of man's history. Primitive man regarded seepages of oil and gas with awe. The presence of eternal fires burning since before the earliest memory of man were regarded as supernatural and were places to be avoided as the homes of demons. Other early civilizations set up shrines and worshipped the fires as agencies of the Gods. A natural gas seepage was responsible for the historically famous Oracle of Delphi.

Petroleum has been used by man since the earliest written history. Noah is believed to have coated the Ark with a pitch which was derived from a petroleum seepage. Petroleum pitch was used in the mortar of the Tower of Babel. Oil from the Isle of Sicily was burned in lamps at the beginning of the Christian era.

Petroleum was first noted in America in 1677, when Pierre Joseph, a French Priest, in a letter records his visit to a spring near Cuba, New York, where the Indians obtained for medicinal purposes, a substance known to them as "Antonontus". This substance was petroleum.

The oil and gas industry in America owes its inception to the early search for salt brines. The accidental discovery of oil and gas in wells drilled for salt brine indicated the practicability of obtaining supplies of petroleum and natural gas by drilling methods.

Ignorance of the uses of petroleum and natural gas was largely responsible for the long delay in development of these great resources, despite the knowledge of the occurrence of both substances.

The earliest use of petroleum for illumination was in Sicily where it is first known to have been used in the early Christian era. In America, the first uses of petroleum were for medicinal purposes and it was this use which gave the substance its first value and attracted the attention of business men to the financial rewards which might be obtained from the development of new supplies.

The financial success of a few men who were engaged in the Sale of "Rock Oil" as a patent medicine attracted the attention of George H. Bissell, a New Haven, Connecticut business man. It occurred to him that if petroleum could be found in large quantities by exploration directed with it as the sole objective, large financial rewards would result. Much of the so-called "Rock Oil" on the market was derived from Salt Brine Wells; hence it seemed logical that drilling would be the proper method of finding oil. Mr. Bissell did not overlook the possibilities of using petroleum as a source of fuel, as he obtained a report from Professor Benjamin Silliman of Yale University, in which he recommended the substance as a source of "Rock Oil" for use as an illuminant.

Armed with his ideas, Mr. Bissell encouraged a group of his associates to go in with him and acquire a tract near Titusville, Pennsylvania, and proceed with drilling operations. The upshot of this venture is too well known to elaborate on. The result of the operation was the discovery of oil at sixty-nine and one-half feet, in the now famous Drake Well, and the birth of the oil and gas industry.

The Drake well was not large by comparison with those which were soon discovered. Its importance lay in the fact that it demonstrated the possibility of recovering large quantities of oil from the earth by drilling.

The development of new oil fields was rapid after this first venture, and within the space of a few short years, petroleum had been discovered in large quantities in Pennsylvania, Ohio, and West Virginia.

Natural gas was found associated with the petroleum in much of this area, but it was considered a nuisance in the early years of the petroleum industry.

The first successful pipe line used to transport oil was built in 1865 by E. Van Syckel and associates. This short crude pipe line quickly demonstrated its efficiency and capital was encouraged to invest in larger lines. It was apparent as more oil lines were built, that here was the solution to the great problem confronting the use of natural gas, i.e. transportation from the source to the place of consumption.

Natural gas had been used in very limited quantities many years prior to the discovery of oil in the Drake Well. The first authentic use of natural gas in this country was at Fredonia, New York. A well dug by hand in 1820 was piped to a number of houses by means of wooden conductors, and the gas was used for street lighting. A few other isolated cases of the use of natural gas as a fuel were known in Pennsylvania and New York. However, it was not until 1872, that an iron pipe line for the use of natural gas was built. This first successful piping of natural gas was used to convey gas from the Newton Well in Crawford County to the City of Titusville, Pennsylvania. The line was three and one-fourth inches in diameter and about five and one-half miles long. This early pipe line demonstrated a successful method of transporting natural gas, and was quickly followed by other lines from sources of natural gas to nearby communities.

The first natural gas pipe line to Pittsburgh, Pennsylvania, was built in 1882, and was used to convey gas from the Haymaker Well discovered in 1878 near Murrysville, Pennsylvania.

The natural gas industry was firmly established by 1884, and most of the communities within piping distances of the Appalachian Gas Fields were being supplied with natural gas. As early as 1882, oil operators had begun to appreciate the value of this product which had been formerly considered a necessary evil, and by 1885, capital had been attracted to this new industry to such an extent that companies and individuals were actively seeking to develop new gas pools. Prior to this time, all natural gas in the Appalachian area had been discovered in the search for oil.

An outline map of Pennsylvania, showing the Oil and Gas Fields of the State as of 1889, is shown on page 5 of this report. This map was taken from one published by the Second Geological Survey of Pennsylvania. The reader will be interested in comparing this map to the one on page 6 which shows the development as of 1936.

The first gas well drilled by The Peoples Natural Gas Company was completed in 1886 on the Charles Deister farm near Murrysville, Pennsylvania, in the Murrysville gas field which had been discovered with the drilling of the famous Haymaker well in 1878.

The developments which have taken place in the search for natural gas since the above early beginning of the industry to the present era of high pressure pipe lines and very deep wells, can best be followed by an account of the development of The Peoples Natural Gas Company since 1885, which will be treated in detail in subsequent pages of this report. The development of the Peoples Natural Gas Company has been continuous and without interruption since that time, and since it closely parallels the



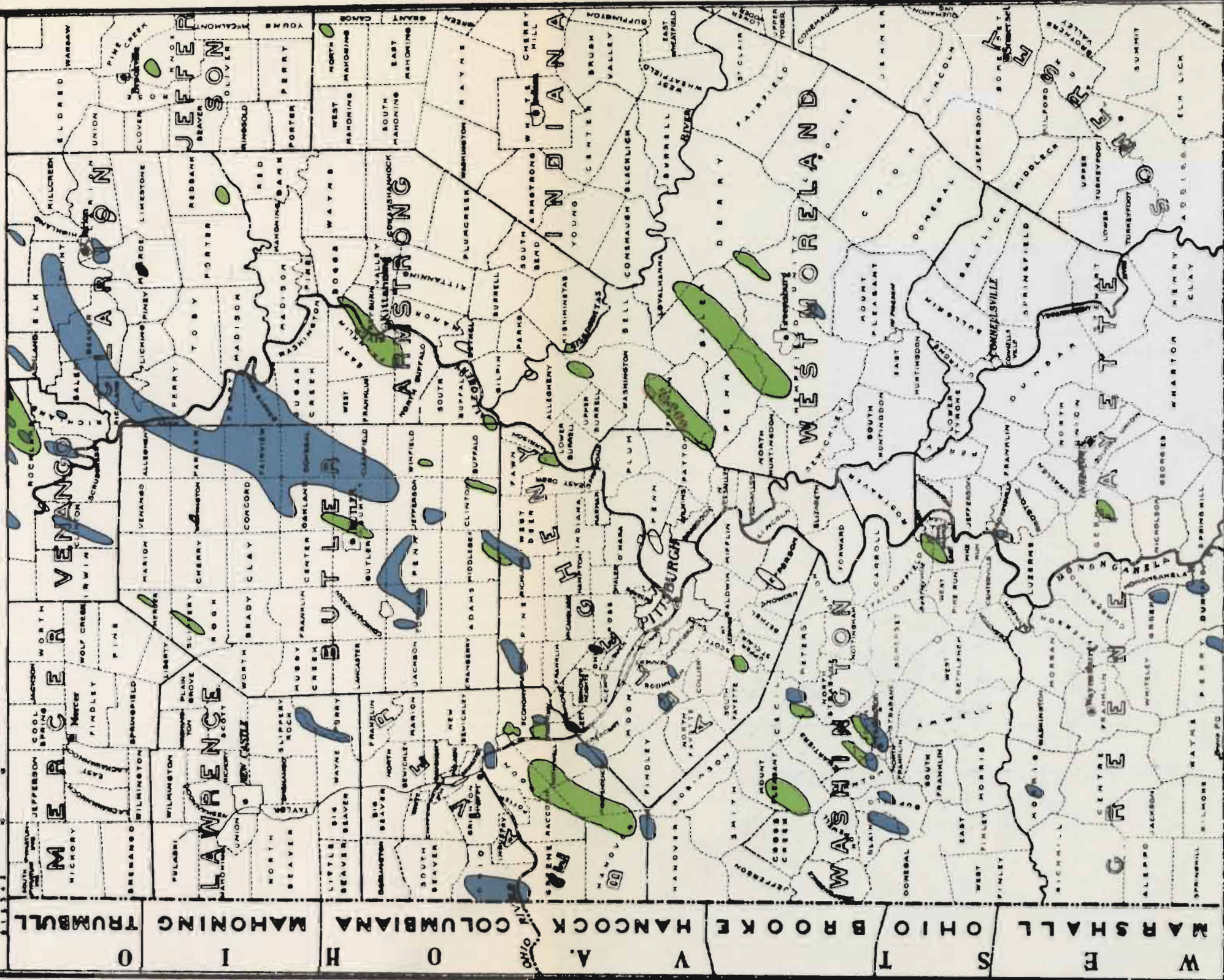
MAP SHOWING
OIL & GAS FIELDS IN S.W. PENNA.
AS OF JULY 1889 *

* Taken From Second Geological Survey of Penna.

LEGEND

- Gas Field
- Oil Field
- Area Operated by The Peoples Nat. Gas Co.

SCALE IN MILES



WETZEL MONONGALIA PRESTON GARRETT
W E S T V A. M A R Y L A N D



LEGEND

Gas Field

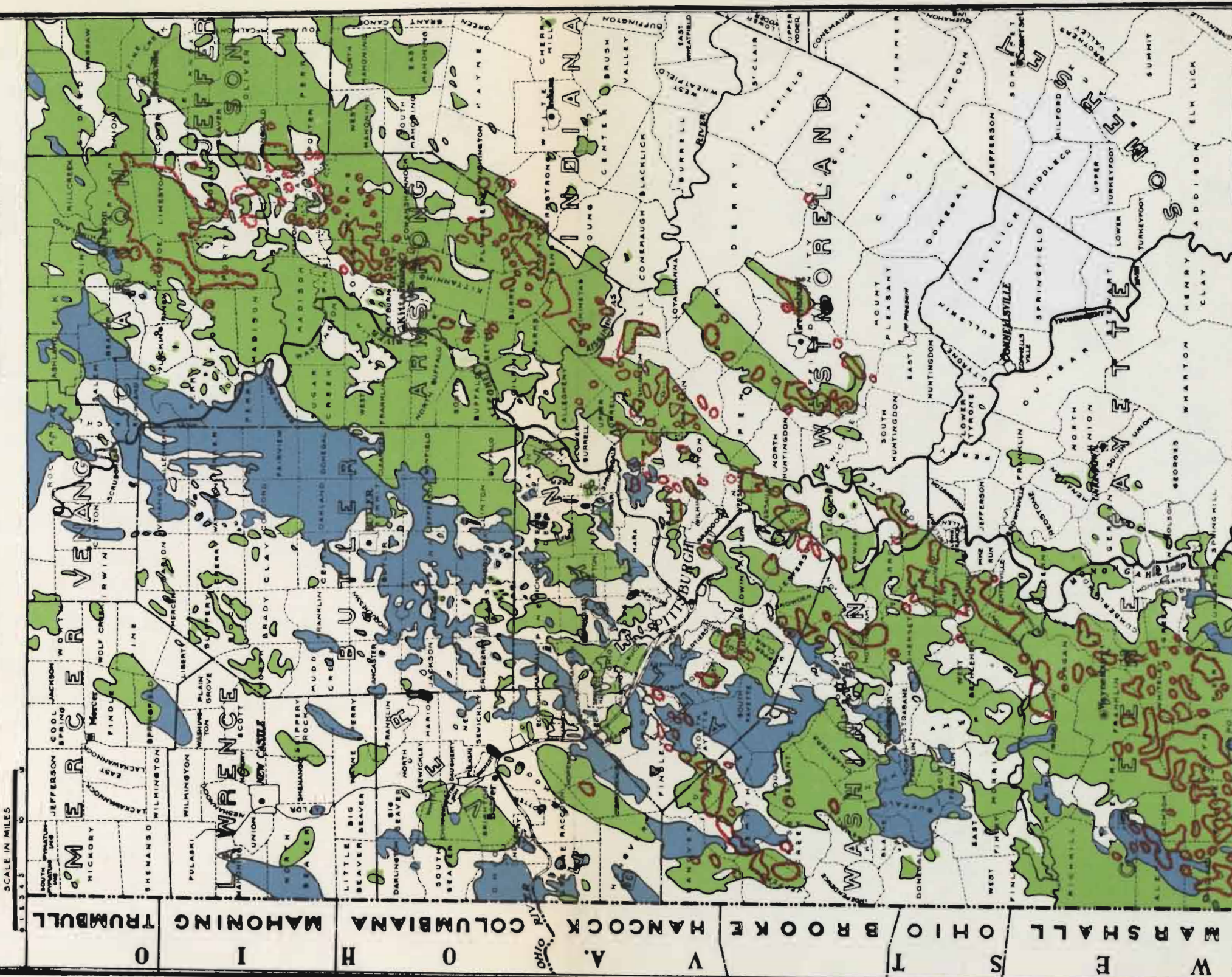
Oil Field

Area Operated by The Peoples Nat. Gas Co.

MAP SHOWING

OIL & GAS FIELDS IN S.W. PENNA.

AS OF THE END OF 1936



WETZEL MONONGALIA PRESTON GARRETT

W V A. MARYLAND

growth of the industry in the State, its history is much the same as the development for the entire producing portion of Pennsylvania.

**MODE OF OCCURRENCE
OF OIL AND GAS
IN PENNSYLVANIA**

MODE OF OCCURRENCE

Introduction:

The early oil and gas fields in Pennsylvania were largely discovered by chance. Some of the discovery wells were located in a certain locality because of well known oil and gas seepages, and others were located by the ancient "Peach Twig Method", as a heritage from the early methods of locating water wells.

After some experience had been gained from the early fields, it was noticed that oil and gas fields had a tendency to run in a Northeast Southwest direction, and once a pool had been opened, this trend was followed. This was the only criteria accepted by many operators for years and there are still some in the industry who cling to this method. The early operators did not realize it, but this method had some sound scientific backing, as we now know that anticlines and stratigraphic traps are usually developed along the same northeast southwest trend.

Structure of the Rocks - Importance to the Oil and Gas Industry:

The anticlinal theory for the accumulation of oil and gas was first proposed by Dr. William Logan, Director of the Geological Survey of Canada as early as 1844, but it did not meet with approval, nor was any systematic effort made to prove it until the late Dr. I. C. White started a study of the oil and gas fields of West Virginia in 1883. He noticed a striking alignment of producing wells along the axis of broad low folds (technically known as anticlines) in the rocks, and by 1885 he published his ideas, which again brought the anticlinal theory into prominence. He was at first ridiculed for his convictions, but in 1889, he was able to

prove the theory, when a well was located on the strength of anticlinal structure came in to prove the existence of the Mannington Field.

The value of these early theories of oil and gas accumulation have long since proven their importance and are now so well recognized by the industry that any discussion of oil and gas development in an area should be less than incomplete without an explanation of the geological phenomena which is responsible for the deposits.

The Appalachian Geosyncline or Basin:

The oil and gas producing portions of Pennsylvania, namely, the western part of the State, are situated in a great trough which extends from Cincinnati, Ohio, on its western rim to the Appalachian Mountain front on the eastern rim. This great trough or basin extends in a north-easterly direction from Alabama through Tennessee and the western part of West Virginia and Pennsylvania to and beyond the Catskill Mountains in New York State. In Pennsylvania, it includes the western and Northern Counties, and much of this area is now productive of oil or gas, and has been quite thoroughly explored. This great trough was formed by a gradual and gentle down-warping of the rocks from the slow accumulation of sediment in the basin which was going on simultaneously with the down-warping, and indeed, the weight of which was no doubt responsible for the down-warping.

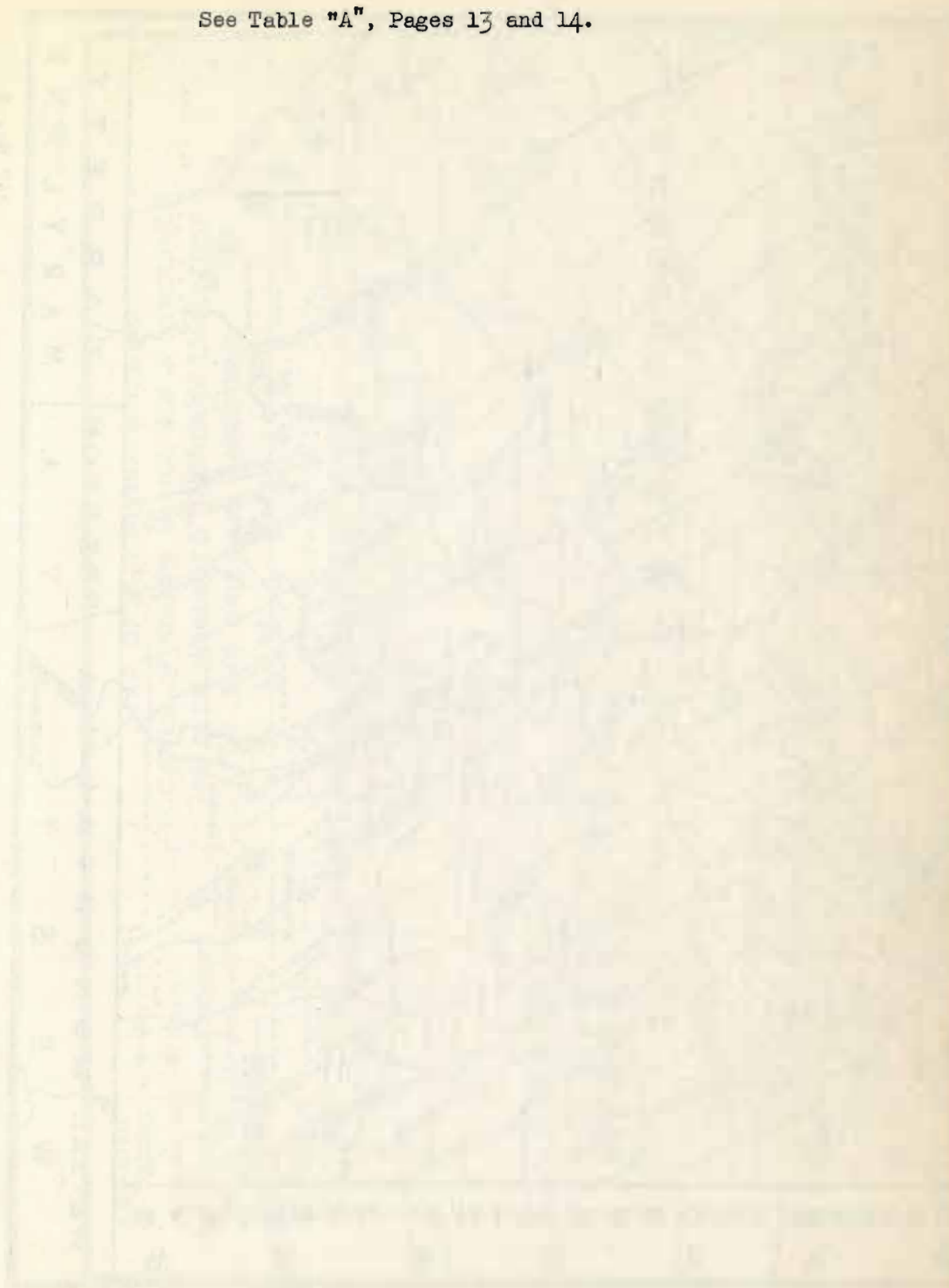
All of the rocks in the basin were later subjected to great compressive forces from the east which caused the crust to break and crumple on the east nearest the thrust, and to be folded into gentle rolls for a long distance to the west. The parts of the folds which are raised into

arches are known as "anticlines". The small trough between the crest of two arches is known as a "syncline". These gentle folds or anticlines were superimposed upon the rocks within the great trough. They are like a wrinkled surface on a great basin. The small scale map on Page 12, which covers Southwestern Pennsylvania shows the locations of the better known anticlines in Pennsylvania, and the diagram on Page 15 shows diagrammatically the affect of the folding which the rocks in the great basin have undergone. The view is similar to one on a much greater scale, that one would have of the rocks, if a deep canyon were cut across Pennsylvania at right angles to the direction of the axis of the folding. The diagram is a cross section of the area shown on the map on Page 12.

These anticlines are very important to the production of natural gas in Pennsylvania, as they provide a trap in which gas can accumulate. Any gas in the formations will migrate toward the high points on the anticlines where it gradually accumulates until it has reached a pressure equal to the pressure exerted upon the rocks in which the gas is stored, and when these areas are drilled, a gas pool is said to have been found. Dome like folding is the most important trap for natural gas. In this type of fold, the anticline is found to have portions of its crest along the axis, which are folded higher than at other points, and gas pools are frequently found in these highest portions of the dome. An illustration indicating this type of accumulation is seen in Figure 1, page 17.

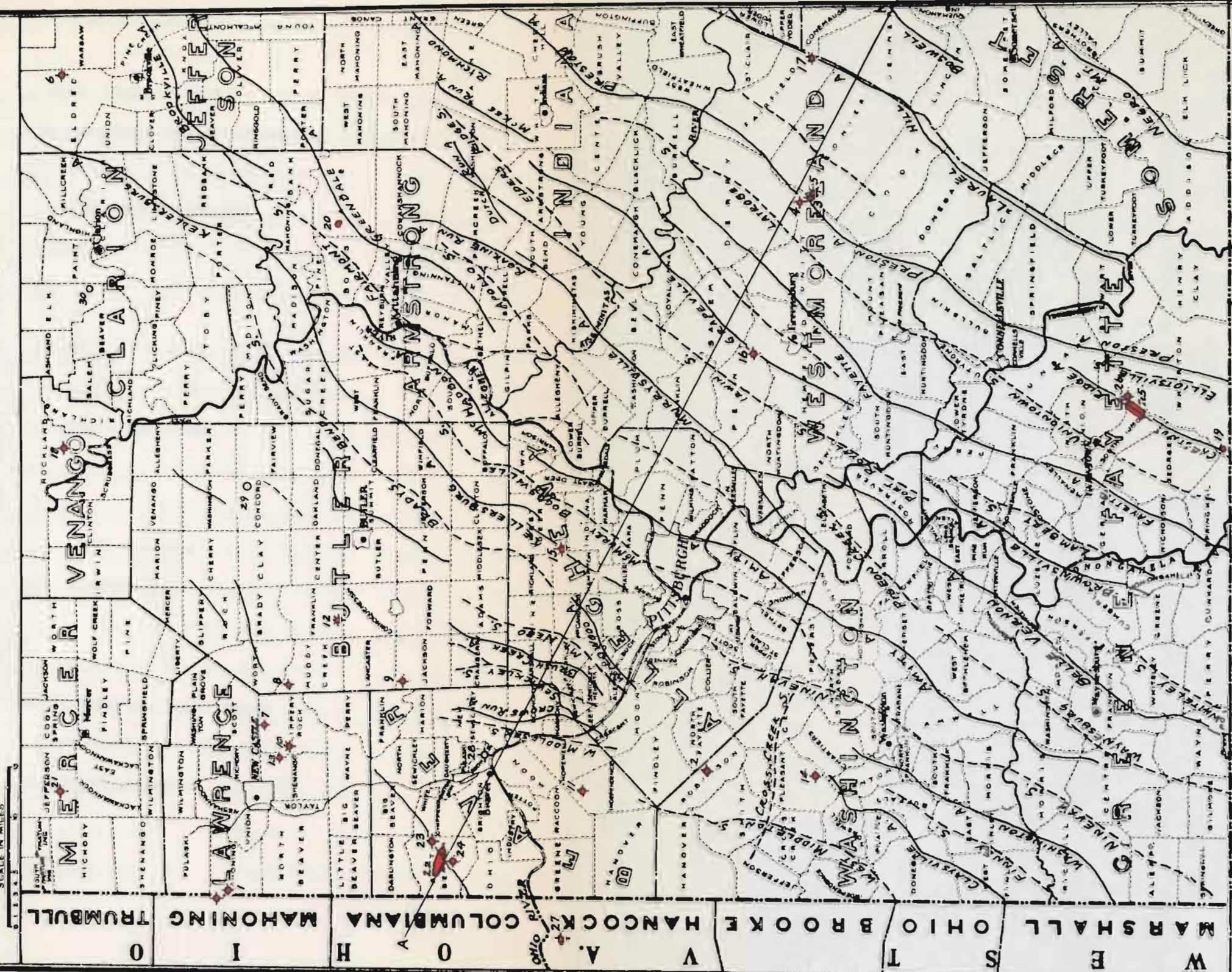
The most essential geological feature for the accumulation of natural gas or oil is the presence of some sort of trap, that is, a place where the migration of oil and gas is permanently interrupted, and hence must accumulate. The above mentioned dome type structure is one type of

See Table "A", Pages 13 and 14.



MAP OF S.W. PENNA. SHOWING
LOCATION OF KNOWN ANTICLINES & SYNCLINES
AND DEEP WELLS TO ONONDAGA LIMESTONE
AND ORISKANY SANDSTONE

- LEGEND**
- Anticline
 - Syncline
 - Show of Gas - Abandoned
 - Gas Pool - Oriskany or Onondaga
 - Dry Hole
 - Gas Well



WETZEL MONONGALIA PRESTON GARRETT
WEST V A MARYLAND

WELLS IN SOUTH WESTERN PENNSYLVANIA WHICH HAVE BEEN DRILLED TO THE ONONDAGA LIMESTONE OR THE ORISKANY SANDSTONE

See Map Page 12

Map No.	Operator	Farm Name	Township	County	Completion Date	Total Depth	Results
1	Freehold Oil & Gas Co.	Hughes	Mahoning	Lawrence	Fall - 1904	4000	Dry in Oriskany - Abandoned
2	The Peoples Natural Gas Co.	R. A. Geary	Robinson	Washington	7/ 1/17	7248	Salt Water in Oriskany; also show Gas. Plugged back to shallow Sands.
3	The Peoples Natural Gas Co.	Booth & Flynn #1	Ligonier	Westmoreland	3/ 3/20	6863	Small Amt. of gas in Onondaga; also some Salt Water - abandoned 2/28/31
4	The Peoples Natural Gas Co.	Seger Bros.	Derry	Westmoreland	10/ 3/24	6989	Small show of gas in Onondaga - Abandoned
5	The Peoples Natural Gas Co.	Booth & Flynn #2	Ligonier	Westmoreland	7/ 3/25	7756	297 M. cu. ft. in Onondaga & Salina - Abandoned 7/24/31
6	F. C. Deemer	Verstine & Kline	Eldred	Jefferson	8/24/33	6500	Dry in Oriskany - (No Sand) - Abandoned
7	Jas. Duff, et al.	J. Scott Munnell	Slippery Rock	Lawrence	4/ 6/34	4767	Show of Gas in Oriskany - Abandoned
8	Jas. Duff, et al. (Phillips & Wittmer)	Lehigh Portland Cement Co.	Muddy Creek	Butler	1/ 6/35	5170	Show of Gas in Oriskany - Abandoned
9	American Gas Company	Henry Fancher	Jackson	Butler	12/ 6/36	5372	Salt Water in Oriskany - Abandoned
10	Carnegie Natural Gas Co.	Lawrence Heichel	Slippery Rock	Lawrence	12/28/36	4757	Show of Gas in Oriskany, also Salt Water - Abandoned
11	Laughner & Wittmer	John Willsman	Independence	Beaver	4/ 2/37	5320	Salt Water in Oriskany - Abandoned
12	American Gas Company	Perry Davis	Franklin	Butler	4/22/37	5587	Show Gas in Oriskany - Abandoned
13	Carnegie Natural Gas Co.	W. A. Currie	Shenango	Lawrence	10/20/37	4845	Dry in Oriskany - Abandoned
14	Norwood Johnson, et al.	Jas. McBurney	Mt. Pleasant	Washington	3/ 7/38	7050	Dry in Oriskany, Show of Salt Water - Abandoned
15	South Penn Oil Co.	Fred Backhaus	West Deer	Allegheny	8/ 3/38	7365	Dry in Oriskany - Abandoned
16	The Peoples Natural Gas Co.	John Marshall	Penn	Westmoreland	8/ 9/38	7777	Dry in Oriskany - Abandoned
17	Potter Development Co.	Indiana Sav. & Tr. Co.	Fairfield	Westmoreland	9/ 1/38	7725	Show of gas in Onondaga; Salt Water in Oriskany - Abandoned
18	McHenry Oil Co.	Sophie Stillman	Rockland	Venango	12/27/38	5055	Drilled Thru Oriskany Horizon - No Sand Found
19	Convex Glass Co.	Paul Dunham	Springhill	Fayette			Not Completed - Some gas & Salt Water in Onondaga
20	The Peoples Nat. Gas Co.	Lowry Martin	Wayne	Armstrong			Drilling
21	Beal & McCandless	Snyder-Smith	French Creek	Mercer			Drilling

WELLS IN SOUTH WESTERN PENNSYLVANIA WHICH HAVE BEEN DRILLED TO THE ONONDAGA LIMESTONE OR THE ORISKANY SANDSTONE

See Map Page 12

WELLS IN AND NEAR PRODUCING FIELD - SOUTH BEAVER TOWNSHIP, BEAVER COUNTY, PENN.

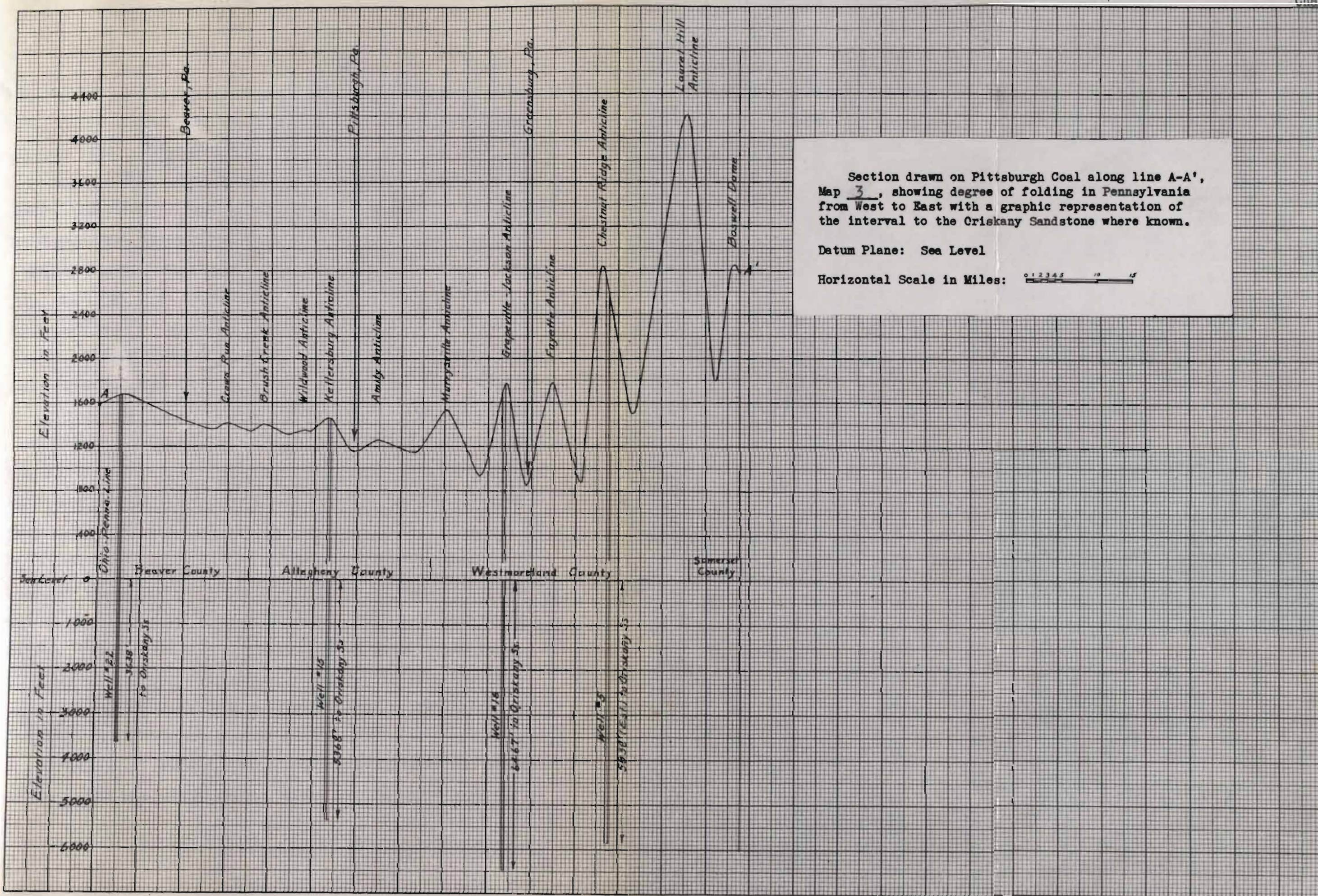
Map No.	Operator	Farm Name	Township	County	Completion Date	Total Depth	Results
22	John Galey, et al	Charlotte Calvin	South Beaver	Beaver	10/13/35	4551	787 M Cu. ft. gas in Oriskany - Now Abandoned
22	John Galey, et al	Jeane Duff	South Beaver	Beaver	7/26/37	4824	1,125 M. Gas in Oriskany
22	John Galey, et al	James Tennis Hrs.	South Beaver	Beaver	12/15/37	4613	3,000 M. Cu. ft. Gas in Oriskany
22	T.W. Phillips O.& O.Co.	James Smith	South Beaver	Beaver	3/ /38	4558	4,500 M. Cu. Ft. Gas in Oriskany
22	John Galey, et al.	J. C. Allen	South Beaver	Beaver	11/ 1/38	4782	3,000 M. Cu. Ft. Gas in Oriskany
23	A. J. Wise & Belmont Quadrangle Drilling Co.	Beaver Falls Air- port Property	South Beaver	Beaver	6/11/37	4824	Salt Water & Show of Gas in Oriskany - Abandoned
24	John Galey, et al	Stephen Calvin	South Beaver	Beaver	2/ 8/39	4860	Salt Water in Oriskany - Abandoned

WELLS IN AND NEAR PRODUCING FIELD NEAR UNIONTOWN, PENNA.

25	Potter Development Co.	Leo Heyn #1	South Union	Fayette	4/23/37	6670	2,000 M. Cu. Ft. Gas in Onondaga
25	Potter Development Co.	Leo Heyn #2	South Union	Fayette	3/25/38	6770	3,500 M. Cu. Ft. Gas in Onondaga
25	The Peoples Nat. Gas Co.	Piedmont Coal Co.	South Union	Fayette	1/ 5/39	6825	2,600 M Cu. Ft. Gas in Onondaga
25	French et al	Mrs. J.H. Sorg	North Union	Fayette	3/10/39	7114	2,243 M. Cu. Ft. Gas in Onondaga & Oriskany
25	New Penn Dev. Co. & Wm. Snee	Indian Creek Coal and Coke	South Union	Fayette	4/ /39	7161	1,140 M. Cu. Ft. Gas in Onondaga
26	Greensboro Gas Co.	J. R. Thompson	Wharton	Fayette	8/11/38	8159	Show in Onondaga - Abandoned

WEST VIRGINIA

27	John Galey, et al	Rachael Talbot	Grant	Hancock	5/28/37	5015	Dry in Oriskany - Abandoned
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Section drawn on Pittsburgh Coal along line A-A', Map 3, showing degree of folding in Pennsylvania from West to East with a graphic representation of the interval to the Crickany Sandstone where known.

Datum Plane: Sea Level

Horizontal Scale in Miles: 0 1 2 3 4 5 10 15

KEUFFEL & ESSER CO., N. Y. NO. 368-111
20 x 30 to the inch, 10th line heavy
MADE IN U. S. A.

trap commonly found in Pennsylvania. A good example of a pool of this type is that one shown on the Map on page 5, located in Hempfield and Salem Townships, Westmoreland County.

Faulting of the rocks which is another term for a break in the earth's crust is another type of trap which is prospective for gas accumulation when other features, such as an upward dip of the rocks toward the fault, are present. This type of accumulation is illustrated in Figure 3, page 17. It is not known to be a common reason for the shallow gas pools in Pennsylvania, but is important in the deep Oriskany sand gas fields of Northern Pennsylvania and in the gas pool recently discovered near Uniontown.

Stratigraphic Traps are very important as a cause of accumulation of oil and gas in Pennsylvania. A diagram showing this type of accumulation is shown in Figures 1 and 2, page 17. It results when a sand or other porous formation thins out in a direction in which the formations are rising in dip. This condition results when sands have a tendency to be deposited in lenticular bodies a few miles in length and breadth, and since this condition is very common in Pennsylvania, many of the gas fields in the State owe their accumulation to this type of trap. The same favorable conditions are present when porous formations become non-porous in an up-dip direction. Typical examples of the two types of Stratigraphic Traps are to be found throughout the Pennsylvania gas fields, although it is most pronounced in Greene and Clarion Counties. The gently folded anticlines of Pennsylvania are important to this type of accumulation, as the frequent reversals of dip

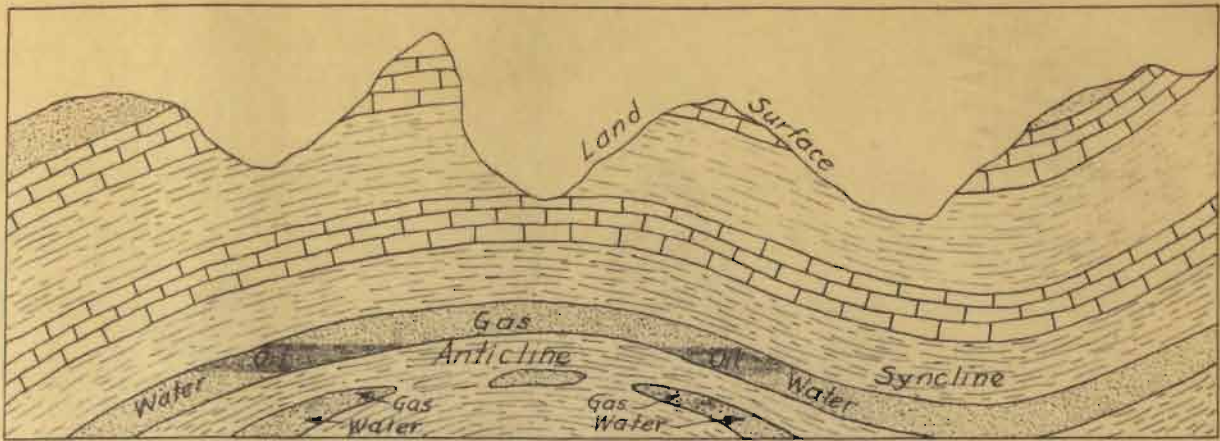


FIGURE 1.
ILLUSTRATING ACCUMULATION OF GAS, OIL, AND WATER
ON ANTICLINAL OR DOMAL TYPE STRUCTURE

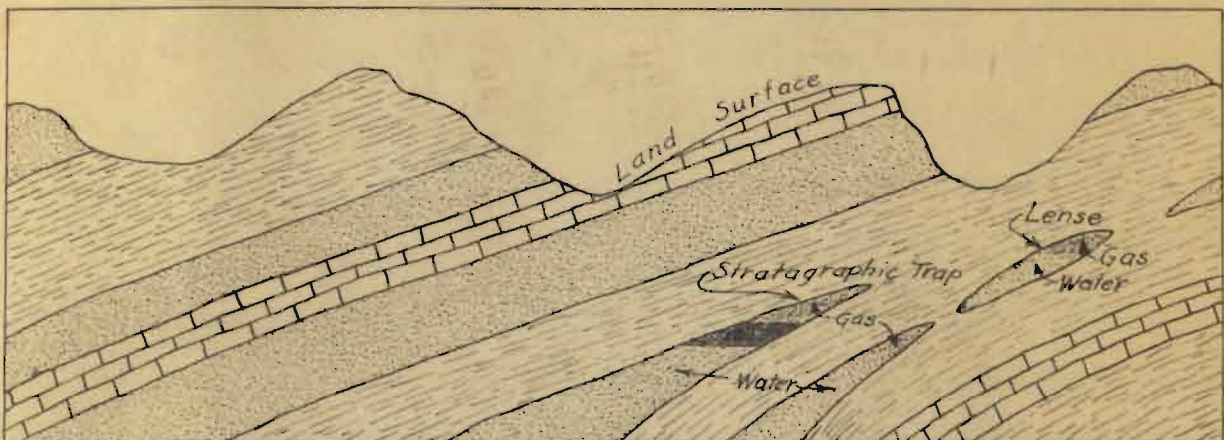


FIGURE 2.
ILLUSTRATING ACCUMULATION OF GAS, OIL, AND WATER ON MONOCLINAL
STRUCTURE DUE TO STRATAGRAPHIC TRAP AND LENSING

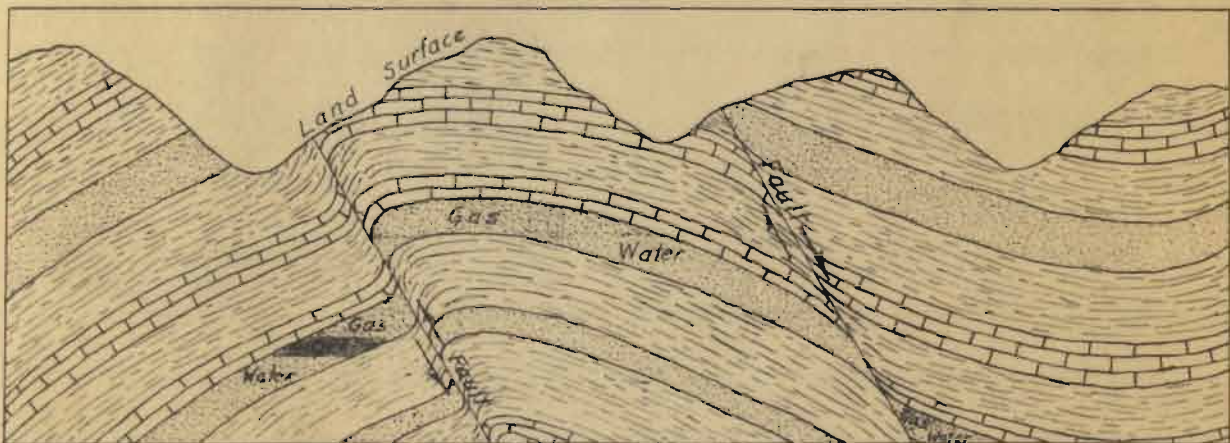


FIGURE 3.
ILLUSTRATING ACCUMULATION OF GAS, OIL, AND WATER
ON FAULTED TYPE STRUCTURE

SKETCHES DEPICTING PRINCIPAL STRUCTURAL
CONDITIONS FAVORABLE FOR THE ACCUMULATION OF
OIL AND GAS IN PENNSYLVANIA.

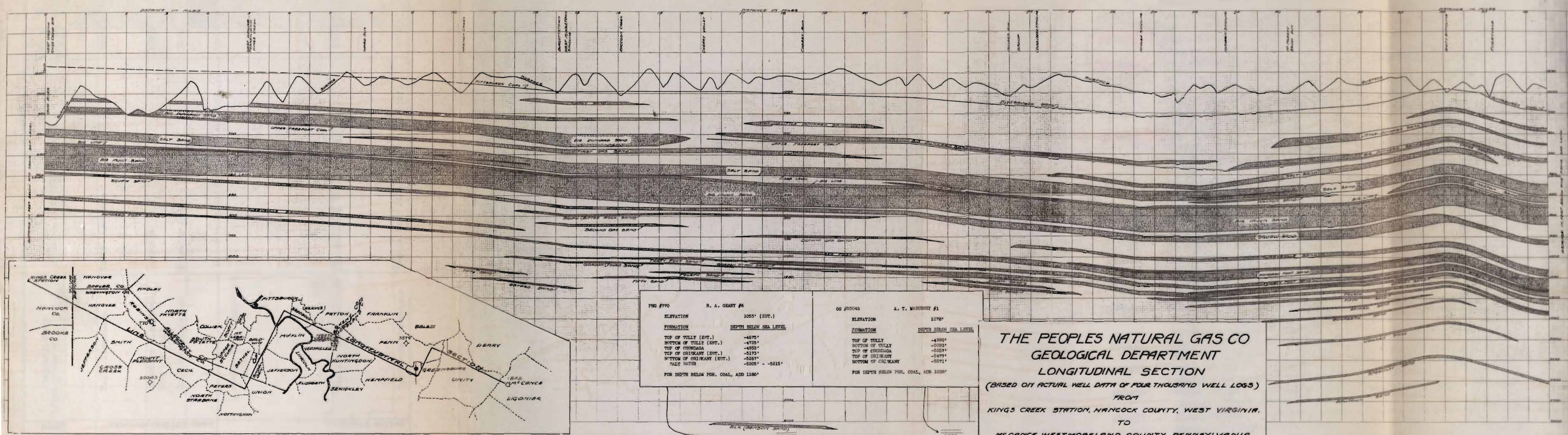
LEGEND: SANDSTONE SHALE
 Limestone

resulting from the anticlines and synclines, provide a direction for the gas to migrate in the porous formations up the dip to the place where the porous formations either thin out or become non-porous. The frequency of lenticularity of sands is well illustrated in the cross-section shown on Page 19.

Stratigraphy:

The importance of structure has been discussed above. The other most important condition for oil and gas accumulation is stratigraphy. By this is meant the type of formations which are found in the geologic column. Pennsylvania has been peculiarly fortunate in this respect, in that it contains a great thickness of Pennsylvanian and Devonian rocks which are sedimentary in origin and which include a large number of porous sandstones sandwiched between shales. The porous sandstones acted as blotters which absorbed the gas and oil from the adjoining shales as it was generated in ages past. The sandstones also have a tendency to be permeable, that is, a light substance such as gas, oil or water, can migrate for some distance through the sand. The structural conditions described above have brought about the trapping phenomena by which oil and gas have accumulated at great pressures.

In Pennsylvania, some forty-two formations are known to be capable of containing oil and gas. The table and geologic log shown on Page 20, illustrate the relative positions of these formations, together with the Geological and Driller's names which have been ascribed to them. Of course, it is rare to find more than three or four of these formations containing oil and gas in any one locality, and frequently only one or more of them are productive.



WV #770	R. A. GEARY #6
ELEVATION	1055' (EST.)
FORMATION	DEPTH BELOW SEA LEVEL
TOP OF TULLY (EST.)	-4675'
BOTTOM OF TULLY (EST.)	-4705'
TOP OF ONONDAGA	-4953'
TOP OF ORISKANY (EST.)	-5173'
BOTTOM OF ORISKANY (EST.)	-5267'
SALT WATER	-5205' - -5215'
FOR DEPTH BELOW PGM. COAL, ADD 1180'	

OS #25043	A. T. McBRIDE #1
ELEVATION	1378'
FORMATION	DEPTH BELOW SEA LEVEL
TOP OF TULLY	-4980'
BOTTOM OF TULLY	-5000'
TOP OF ONONDAGA	-5257'
TOP OF ORISKANY	-5477'
BOTTOM OF ORISKANY	-5571'
FOR DEPTH BELOW PGM. COAL, ADD 1038'	

THE PEOPLES NATURAL GAS CO
GEOLOGICAL DEPARTMENT
LONGITUDINAL SECTION
(BASED ON ACTUAL WELL DATA OF FOUR THOUSAND WELL LOGS)
FROM
KINGS CREEK STATION, HANCOCK COUNTY, WEST VIRGINIA.
TO
ASCANCE, WESTMORELAND COUNTY, PENNSYLVANIA.

GEOLOGY AND REPAIRED BY J. FRENCH ROBINSON.
TRACED BY W. F. LUBBERG.

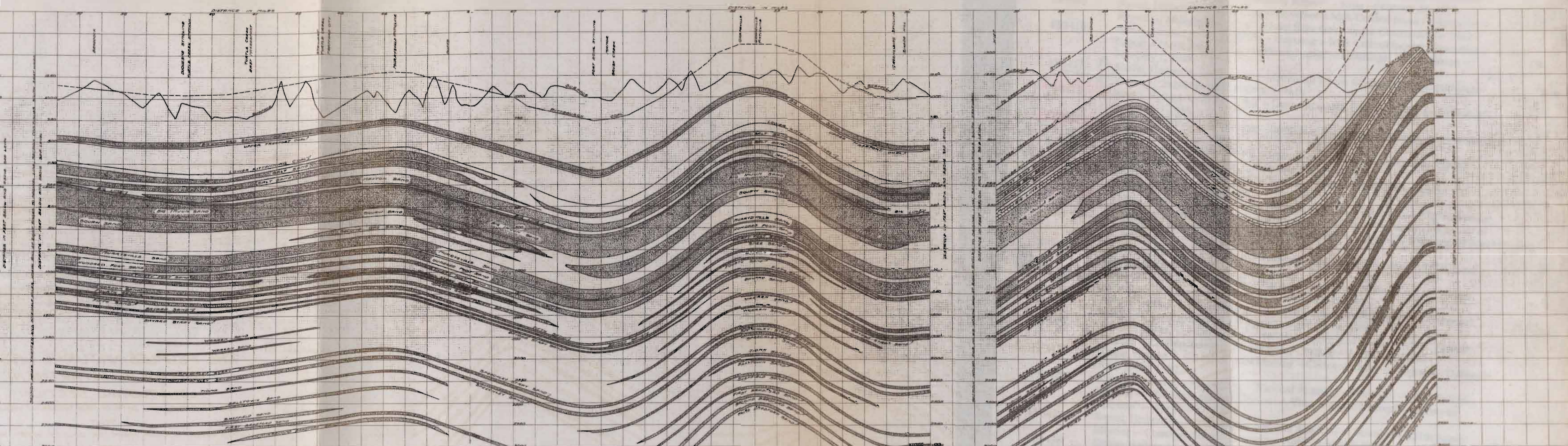


FIG #5079 JOHN MARSHALL #1

ELEVATION	1180'
FORMATION	DEPTH BELOW SEA LEVEL
TOP OF TULLY	-5800'
BOTTOM OF TULLY (EST.)	-5845'
TOP OF ONONDAGA	-5825'
TOP OF ORISKANY	-5487'
BOTTOM OF ORISKANY (EST.)	-5575'

FOR DEPTH BELOW PGM. COAL, AND 1900'

FIG #1942 BOOTH & PLUMB

ELEVATION	1112'
FORMATION	DEPTH BELOW SEA LEVEL
TOP OF ONONDAGA	-5844'
TOP OF ORISKANY (EST.)	-5808'

FOR DEPTH BELOW PGM. COAL, AND 1900'

SYSTEM	SERIES	GROUPS	GEOLOGIC NAME (from place of outcrop)	DRILLERS' NAME	Approx. base of formation in feet	Geological column
SILURIAN	Lower	Medina	Tuscarora Sandstone	Medina Sand (Clinton Sand of Ohio)	8850	
	Upper Silurian	Niagara	Niagara Ls (Lockport)	Niagara, Big Six, Newberg	8360	
DEVONIAN	Upper Devonian	Chemung	Salina Beds (Anhydrite & Shale)			
	Lower Devonian	Holden	Oriskany Sandstone	Oriskany Sand	7070	
DEVONIAN	Upper Devonian	Chemung	Onondaga Limestone, Chert & Silt	Onondaga	6860	
	Lower Devonian	Chemung	Tully Limestone	Tully Limestone	6460	
DEVONIAN	Upper Devonian	Chemung	Shumla Sandstone	Shumla Sandstone	3720	
	Lower Devonian	Chemung	Westfield Shale	Westfield Shale	3800	
DEVONIAN	Upper Devonian	Chemung	Leona Sandstone	Leona Sandstone	3900	
	Lower Devonian	Chemung	Cuba Sandstone	Cuba Sandstone	3000	
DEVONIAN	Upper Devonian	Chemung	Flaggy Sandstone	Flaggy Sandstone	3120	
	Lower Devonian	Chemung	Girard Shale	Girard Shale	3230	
DEVONIAN	Upper Devonian	Chemung	Shale	Shale	3355	
	Lower Devonian	Chemung	Shale	Shale	3460	
DEVONIAN	Upper Devonian	Chemung	Shale	Shale	3610	
	Lower Devonian	Chemung	Shale	Shale	3720	
DEVONIAN	Upper Devonian	Chemung	Shale	Shale	3800	
	Lower Devonian	Chemung	Shale	Shale	3900	
DEVONIAN	Upper Devonian	Chemung	Shale	Shale	4000	
	Lower Devonian	Chemung	Shale	Shale		
MISSISSIPPIAN	Upper Mississippian	Waverly (Pocahontas)	Shale	Shale	1850	
	Lower Mississippian	Waverly (Pocahontas)	Shale	Shale	1990	
PENNSYLVANIAN	Upper Pennsylvanian	Pittsburgh	Pittsburgh Coal	Pittsburgh Coal	170	
	Lower Pennsylvanian	Pittsburgh	Pittsburgh Coal	Pittsburgh Coal	350	

TABLE SHOWING PRINCIPAL OIL AND GAS SANDS
AND MARKER HORIZONS OF PENNSYLVANIA
(To scale 1" = 500') (For vicinity of Pittsburgh)

THE PEOPLES NATURAL GAS COMPANY

DETAIL HISTORY OF DEVELOPMENT OF PRODUCTION

BY PERIODS

1885	-	1886
1887	-	1904
1905	-	1909
1910	-	1914
1915	-	1919
1920	-	1924
1925	-	1936

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY 1886 - 1936

Introduction:

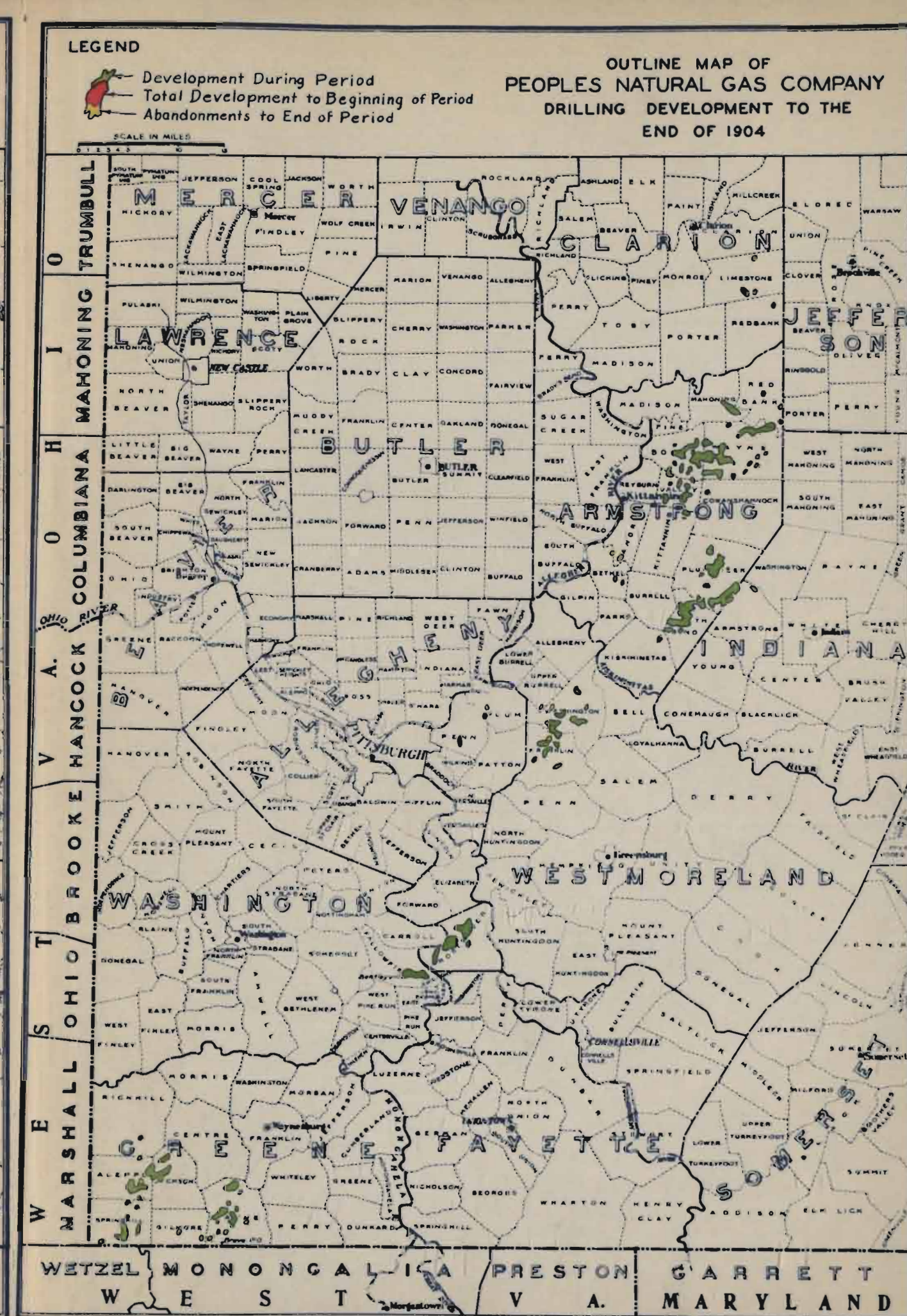
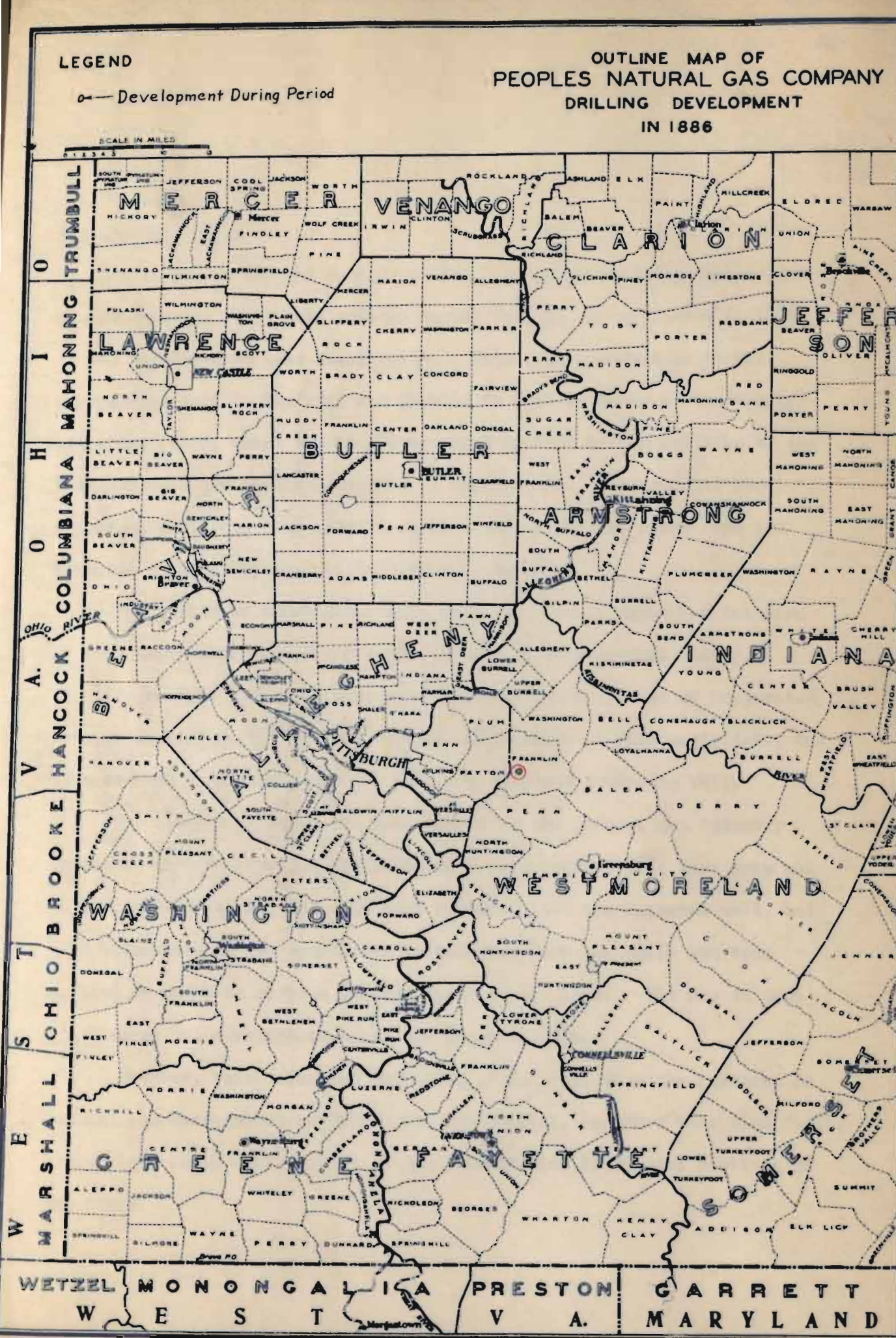
The early history of oil and gas has been described in previous pages of this report, in which the history of development in Pennsylvania was summarized down to 1886.

It is the purpose of this report to treat with the development of The Peoples Natural Gas Company from this point on, including only those outside activities which materially affected The Peoples Natural Gas Company.

The period from 1886 to 1936, inclusive witnessed the development of The Peoples Natural Gas Company from a small company owning only one well to its present mature stage with more than a thousand wells and a network of pipe lines serving many of the communities and industries of Southwestern Pennsylvania. This period is filled with statistical data showing the growth of the Company and the manner in which operations were extended.

To prevent the data from becoming too cumbersome and too difficult to follow, the longer period has been divided up into seven smaller periods as follows: 1886, 1887 to 1904, inclusive; 1905 to 1909, inclusive; 1910 to 1914, inclusive; 1915 to 1919, inclusive; 1920 to 1924, inclusive and 1925 to 1936, inclusive.

Each of the above periods will be treated with the intent of showing the important new developments during that time interval, and the effect which these operations had upon the Company, its production, reserves and acreage.



LEGEND

- Development During Period
- Total Development to Beginning of Period
- Abandonments to End of Period

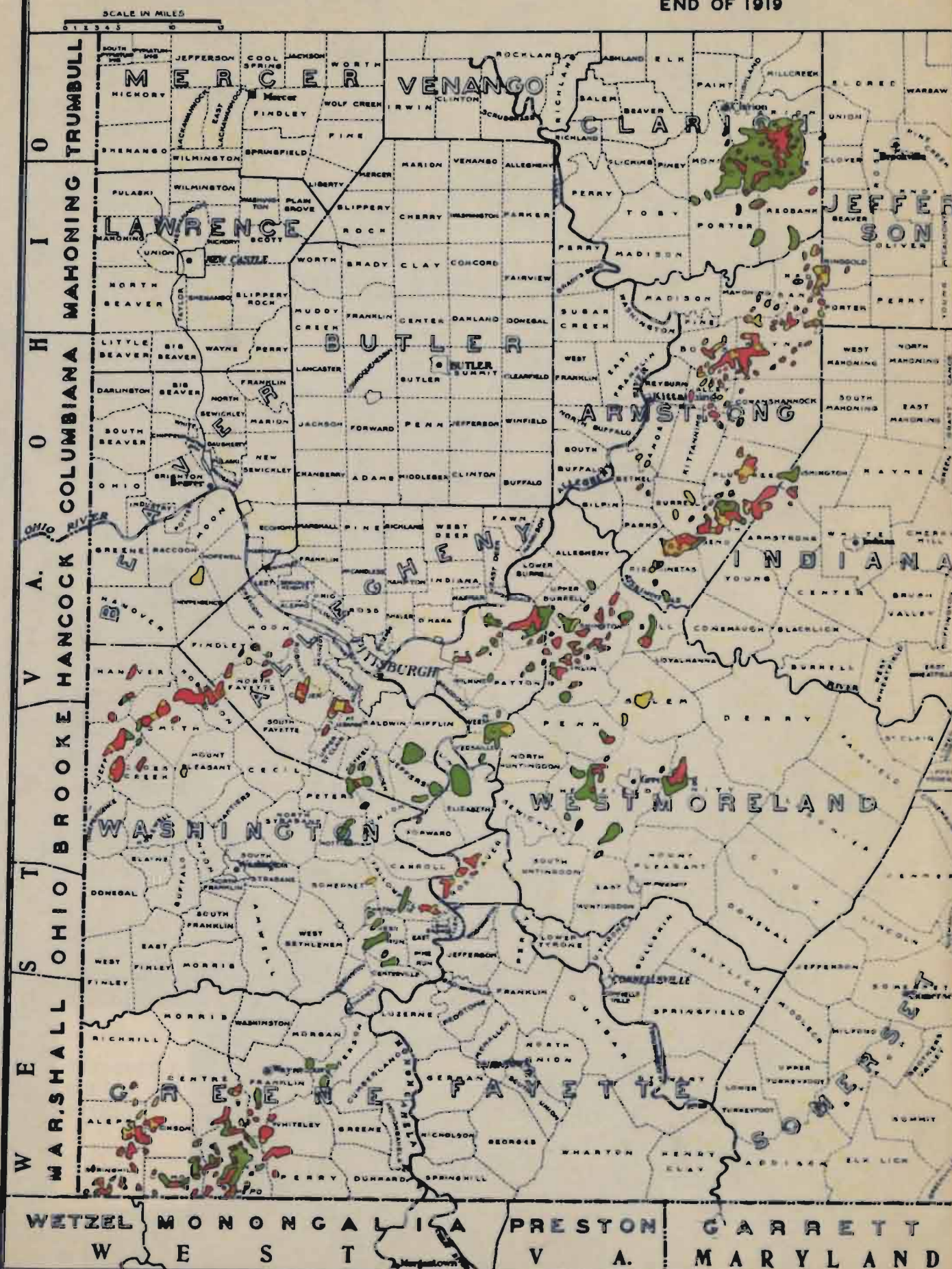
OUTLINE MAP OF
PEOPLES NATURAL GAS COMPANY
DRILLING DEVELOPMENT TO THE
END OF 1914



LEGEND

- Development During Period
- Total Development to Beginning of Period
- Abandonments to End of Period

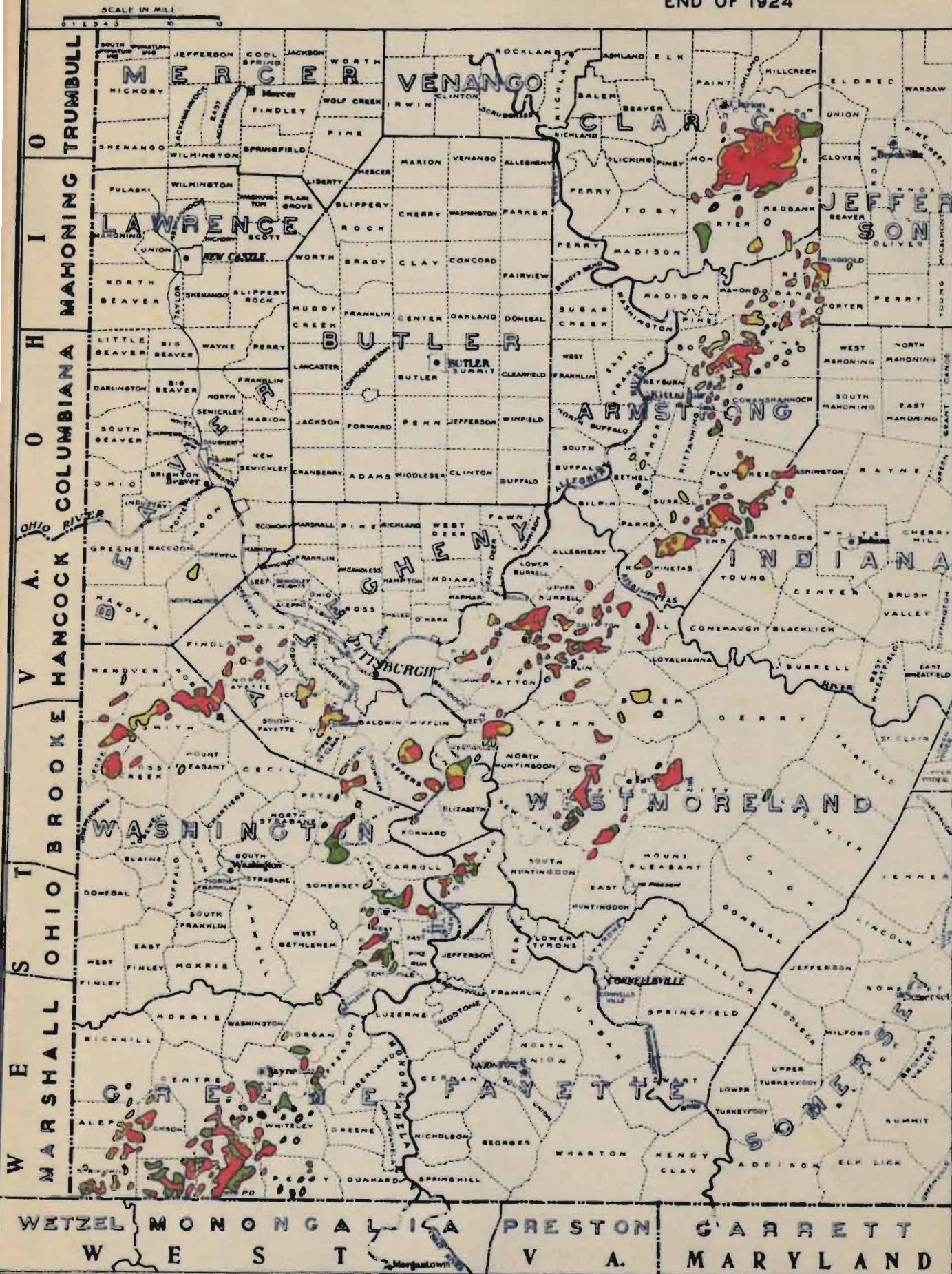
OUTLINE MAP OF
PEOPLES NATURAL GAS COMPANY
DRILLING DEVELOPMENT TO THE
END OF 1919



LEGEND

- Development During Period
- Total Development to Beginning of Period
- Abandonments to End of Period

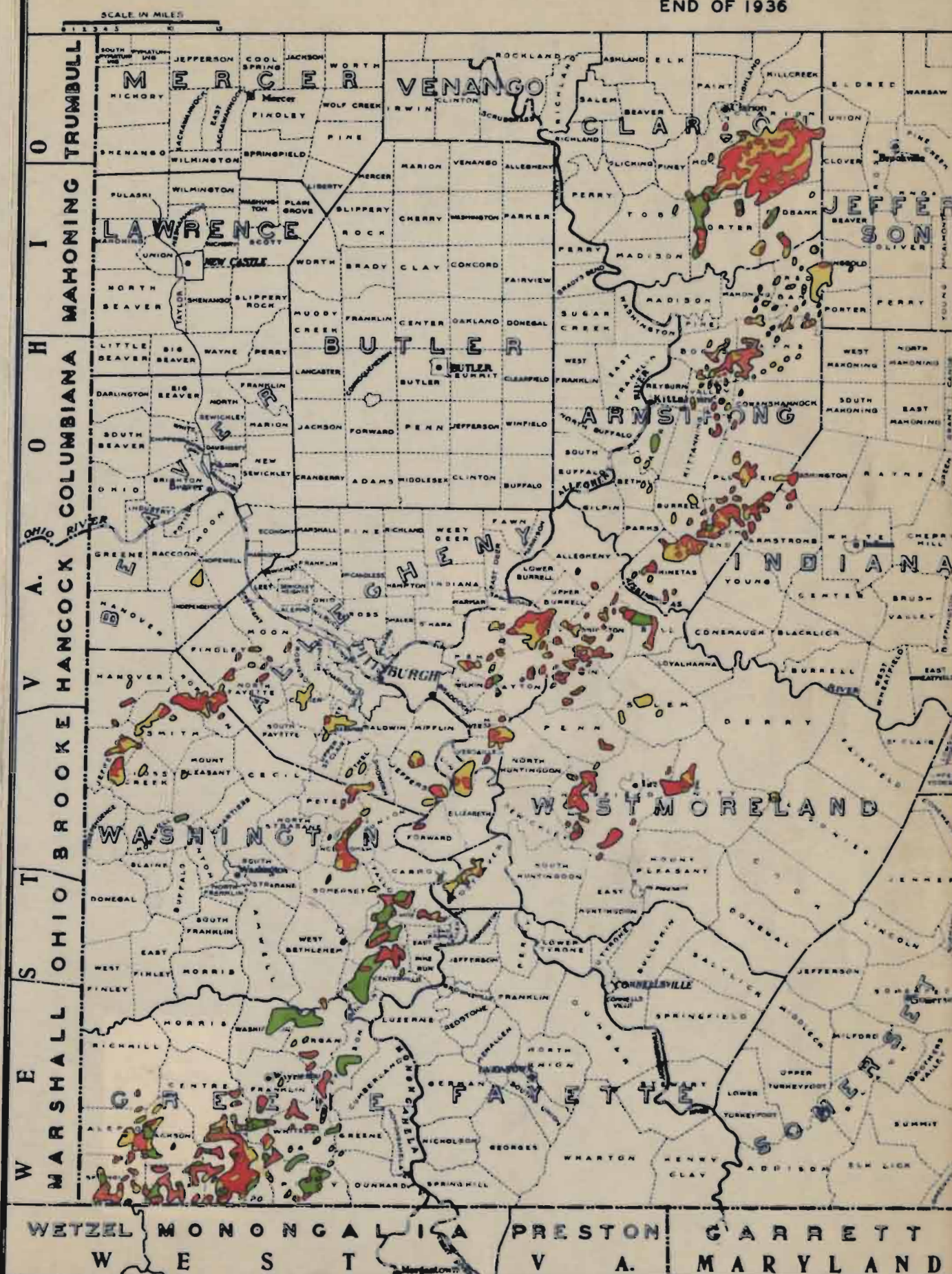
OUTLINE MAP OF
PEOPLES NATURAL GAS COMPANY
DRILLING DEVELOPMENT TO THE
END OF 1924



LEGEND

- Development During Period
- Total Development to Beginning of Period
- Abandonments to End of Period

OUTLINE MAP OF
PEOPLES NATURAL GAS COMPANY
DRILLING DEVELOPMENT TO THE
END OF 1936



Development - 1886

A search of the old records of The Peoples Natural Gas Company discloses that the first well drilled by the Company was completed in 1886 on the Remaley farm near Murrysville. This well was drilled to the Murrysville sand. The well was located in what is known as the "Murrysville Gas Pool", which had been discovered in 1878 by the drilling of the Haymaker well previously mentioned in this report. Some gas had been withdrawn from this pool prior to that time, as gas was piped from the Haymaker well to Pittsburgh, Pennsylvania in 1882.

The reader is referred to Map, page 23 which shows the location of this early well to be in Franklin Township, Westmoreland County.

No records have been preserved to indicate the amount of unoperated acreage carried by The Peoples Natural Gas Company at this early date, but it must have been very small, as they had only one producing well.

The early history of the development of the natural gas industry indicates that the few gas fields which were proven at this time were all in very shallow sands, and that most of them, like the Haymaker well, had been discovered in the search for petroleum. Very few wells had been drilled deeper than fifteen hundred feet at this time. The Map on page 5 shows the development which was known in 1889.

However, this marks the beginning of the time when the interest in natural gas development had attracted new capital, and from this time forth, there was a rapid extension of new gas discoveries in several portions of the State.

INDEX MAP SHOWING REFERENCE NO'S.
AND NAMES OF GAS FIELDS*, THEIR
LOCATION, AND APPROXIMATE LIMITS

(15) Gas Field & Index No.

* As used in text of report
See Table "B", Page 26



See Map, Page 25

Table "B"

FIELD NO.	NAME OF FIELD *	COUNTY	FIELD NO.	NAME OF FIELD *	COUNTY
1	Clarion	Clarion	48	Florence	Washington
2	Manor	Clarion	49	Candor	Washington
3	Frogtown	Clarion	50	Burgettstown	Washington
4	Shamburg	Clarion	51	Eldersville	Washington
5	Kiefer	Clarion	52	Hickory	Washington
6	Greenville	Clarion	53	Buffalo	Washington
7	Shannondale	Clarion	54	Finleyville	Washington
8	Cherry Run	Clarion	55	Somerset	Washington
9	Buttenbender	Clarion	56	Belle Vernon	Washington
10	New Bethlehem	Clarion	57	Zollarsville	Washington
11	Little Mudlick	Armstrong	58	Bristoria	Greene
12	New Salem	Armstrong	59	Woodruff	Greene
13	Mahoning Furnace	Armstrong	60	Waynesburg	Greene
14	Goheenville	Armstrong	61	Garrison	Greene
15	McCrea Furnace	Armstrong	62	Gump	Greene
16	Cowanshannock	Armstrong	63	New Freeport	Greene
17	McNees	Armstrong	64	Lantz	Greene
18	Ford City	Armstrong			
19	Atwood	Armstrong			
20	Say	Armstrong			
21	Shellhammer	Armstrong			
22	Plum Creek	Armstrong			
23	Girty	Armstrong			
24	Roaring Run	Armstrong			
25	Apollo	Armstrong			
26	New Sheffield	Beaver			
27	Imperial	Allegheny			
28	Moon Run	Allegheny			
29	Plum Township	Allegheny			
30	Ninemile Run	Allegheny			
31	White Ash	Allegheny			
32	Clugston	Allegheny			
33	Carnegie	Allegheny			
34	Mifflin	Allegheny			
35	McKeesport	Allegheny			
36	McMurry	Allegheny			
37	Lincoln	Allegheny			
38	Elizabeth	Allegheny			
39	Forward	Allegheny			
40	Pine Run	Westmoreland			
41	Bell Township	Westmoreland			
42	Murrysville	Westmoreland			
43	Delmont	Westmoreland			
44	Grapeville-Arona	Westmoreland			
45	Latrobe	Westmoreland			
46	McCance	Westmoreland			
47	Webster	Westmoreland			

* Nomenclature According to Topographic and Geologic Survey of Oil and Gas Fields of Western Pennsylvania of 1930.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY 1887 - 1904

Statistical Summary of Operations 1887 - 1904

Producing Wells:

(No. at Beg. of Period	1
(Active Wells)No. at End of Period	336
Net change in Period	335
No. of Prod. Wells Drilled in Per.	238
No. of Wells Purchased in Period	135
No. of Dry Holes Drilled	12
No. of Wells abandoned or Sold	38

Data on New Wells:

No. of New Wells Drilled	250
Total Footage Drilled	396,814
Average Depth of Wells	1,735

Drilling Deeper:

No. Wells Drilled Deeper	39
Total Footage from Drig.Dpr.	34,071'
Avg. Addtl. Footage per Well	875'

Source of Production:

<u>New Wells</u>		<u>Sands Drilled</u>		<u>Drig. Deeper</u>	
No.	Tot.	To		No.	Tot.
182	72.8	30' & Above		15	38.5
17	6.8	Bayard Group		3	7.7
14	5.6	Speechley Group		3	7.7
37	14.8	Bradford Group		18	46.2
0	0.0	Below "	"	0	0.0

** - 21 Wells with "No Record"

* - "No Record" Wells not used

Acreage:

Unop.Acreage Beginning of Per.	0.00
Unop.Acreage End of Period	72,862.00
Net Change in Unop. Acreage	72,862.00
No.Ac.Going into Opr.from Unop.	No Record
Operated Acrg.at Beg. of Per.	1.00
Opr. Acreage at End of Period	28,118.71
Net Change in Operated Acreage	No Record
No. Acres Surr.During Period	
Operated - - -	No Record
Unoperated - - -	No Record
No. Acres Acquired During Per.	
Operated - - - -	No Record
Unoperated - - - -	72,862.00

Reserve and Production Data §

Res. from New Wells,Unop.Leases	6,314.3m.
Res. from New Wells,Opr. Leases	2,321.7m.
Res. from Purchased Wells	15,058.5m.
Res. from Drilling Deeper	707.9m.
Total Additional Reserve	24,402.4m.

Production for Period:

(No Available Figures)

§ Reserves at time of drilling are unknown. Figures shown indicate reserve still left in wells after 1913, the year when reserve data first became available.

Introduction:

The period from 1887 to 1904 was one of considerable activity in the gas industry in Pennsylvania. During this period, The Peoples Natural Gas Company made rapid strides and the nucleus of the present Company was developed. The period is one in which the gas fields were extended geographically for some distance.

A reference to the Map on Page 23, which shows the development of The Peoples Natural Gas Company with reference to gas wells, will indicate to the reader the tremendous spreading out of proven areas during the period from 1887 to 1904. The most significant factors dealing with these developments were as follows:

Geographic Distribution of New Areas Under Development During Period 1887 - 1904

In the period beginning with 1887 and ending in 1904, producing areas were extended from the lone well in Franklin Township, Westmoreland County, to five other Counties in Southwestern Pennsylvania. This included portions of Clarion, Armstrong, Allegheny, Washington and Greene Counties. Operations were extended fifty-five miles northeast and sixty-four miles southwest of the original well drilled in 1886.

New Fields Opened or Participated in by the Company:

A total of twenty-two fields became available to the Company during the period 1887 to 1904. In chronological order of availability to the Company these fields were as follows:

NEW FIELDS BECOMING AVAILABLE TO THE PEOPLES NAT. GAS COMPANY FROM 1887-1904

Year	Map #	Name	LOCATION		No.	Dis-	New Co.
lst.	Ref.	of			Cos.	cov-	Wells in
Opr.		Field	Township	County	lst.	ery	Field Dur-
by Co.	No.				Well	Date	ing Period
1892	20	Say	Plum Creek	Armstrong	327	1892	17
1892	40	Pine Run	Washington	Westmoreland	324	1885*	24
1893	23	Girty	S. Bend & Kiski	Armstrong	39	1893	22
1897	22	Plum Creek	Plum Creek	Armstrong	58	1897	39
			So. Bend	Armstrong			
			Armstrong	Indiana			
1899	17	McNees	Valley	Armstrong	259	1899	8
			Kittanning	Armstrong			
1899	18	Ford City	Manor & Bethel	Armstrong	269	1899	6
1900	14	Goheenville	Wayne & Boggs	Armstrong	152	1874 †	77
1901	16	Cowanshannock	Valley	Armstrong	104	1875 †	8
			Cowanshannock	Armstrong			
1902	15	McCrea Furnace	Red Bank	Armstrong	155	1873 †	23
			Wayne	Armstrong			
1903	63	New Freeport	Springhill	Greene	200	1896 †	26
			Aleppo	Greene			
1903	58	Bristoria	Richhill	Greene	197	1896 †	15
			Jackson	Greene			
1903	64	Lantz	Gilmore	Greene	392	1899 †	17
			Wayne	Greene			
1903	62	Gump	Wayne	Greene	304	Prior	7
			Center	Greene		to	
			Franklin	Greene		1903	
1903	56	Belle Vernon	Fallowfield	Washington	250	1887 †	6
1903	47	Webster	Rostraver	Westmoreland	225	1887 †	27
1903	29	Plum Township	Upper Burrell	Westmoreland	283	1900 †	5
			Plum	Allegheny			
1904	6	Greenville	Limestone	Clarion	276	1875 †	3
1904	12	New Salem	Red Bank	Armstrong	346	1894 †	1
1904	3	Frogtown	Limestone	Clarion	389	1875 †	1
1904	7	Shannondale	Red Bank	Clarion	372	1875 †	1
1904	13	Mahoning	Mahoning	Armstrong	341	1875 †	3
		Furnace					
1904	31	White Ash	Penn	Allegheny	189	1904	2
							338

† See Map, Page 25

* Second Geological Survey of Penna.

† Oil & Gas Geology of Western Penna. Fourth Series, Bulletin M19

The Coheenville field in Wayne and Boggs Townships, Armstrong County, had seventy-seven new wells drilled and purchased during the period 1887 to 1904, inclusive. This extensive drilling activity resulted from the discovery of gas in the Murrysville and Hundred Foot sands in the area. The majority of the wells were drilled by the Company, purchases accounting for only one or two of the wells which became available in this field.

The Plum Creek field in Plum Creek and South Bend Townships, Armstrong County, and Armstrong Township, Indiana County, accounted for thirty-nine new wells during the period. Of these wells, nine were purchased and thirty were drilled. Production from the Murrysville and Hundred Foot sands was responsible for the greater portion of this drilling activity.

Another field which was quite active during this period was the Webster field in Rostraver Township, Westmoreland County. Of the total of twenty-seven new wells available to the Company, two were drilled and twenty-five purchased. The Gantz and Fifty foot producing sands were responsible for the major portion of this activity.

The New Freeport field in Springhill, Alleppo and Gilmore Townships, Greene County, contributed twenty-six new wells to the Company. Twenty-two of these wells were purchased and four were drilled. The majority of the wells in the southwestern portion of the field encountered production in the Salt and Big Injun sands, while the wells in the northern part of the field encountered production in the Thirty Foot to Fourth group of sands.

Old Fields Extended by Operations 1887 to 1904:

The only field in which the Company had production prior to 1887, was the Murrysville Field. In the period under study, the operations were extended in this field over an area six miles long and four miles wide, the

the longer distance being Northeast and Southwest. This development took place gradually over the entire period, but at the end of 1904, the field had not been entirely connected, and it was represented by ten small detached areas in which operations had been concentrated.

The operations resulted in the addition of thirty-five new wells, of which, twenty-seven were drilled and ten were purchased. Production was encountered in the majority of these wells in the Murrysville sand.

Trend of Drilling During Period 1887 to 1904:

The statistical summary given above, indicates that the Company had three hundred thirty-six active wells at the end of this period. This represents a net gain of three hundred thirty-five producing wells as a result of operations during these years. Of this group, two hundred thirty-eight producing wells were drilled by the Company and one hundred thirty-five wells were purchased or added by consolidation with other small Companies. Most of the wells were obtained from The Hope Natural Gas Company and The Belle Vernon Light and Heat Company in 1903.

The Company drilled a total of two hundred fifty wells during the period, only twelve of which were dry holes. A total of thirty-eight wells were abandoned or sold during the period.

The average depth of wells drilled during this period was 1,735 feet, and most of the wells obtained gas in the shallow producing horizons, in or above the Thirty Foot Sand. In the northern part of the District, a few wells were drilled to the Bradford Sand, and in the southern part of the District, a few wells were drilled to the Bayard sand. However, the bulk of the wells were to shallow horizons, as shown by the fact that 72.8%

of the wells were in the Thirty Foot or above; 6.8% in the Bayard group; 5.6% in the Speechley group; 14.8% in the Bradford group, and none below the Bradford.

The tendency to find production at shallow depths is brought out even better by the following statistics:

Wells Drilled to a Depth of	0 to 1500'	- 37.2%
Wells Drilled to a Depth of	1501 to 2000'	- 18.8%
Wells Drilled to a Depth of	2001 to 2500'	- 16.2%
Wells Drilled to a Depth of	2501 to 3000'	- 13.4%
Wells Drilled to a Depth of	3001 to 3500'	- 12.9%
Wells Drilled to a Depth of	3501 to 4000'	- 1.5%

The practice of drilling old wells deeper was started as early as 1891, and by 1904, the Company had drilled thirty-nine wells deeper. These drilling deeper operations were confined chiefly to the group of sands above the Thirty-Foot. However, in the northern part of the area, where the Bradford sand is comparatively shallow, quite a number of wells were drilled to this horizon, being a total of 46.2% of the thirty-nine wells which were drilled deeper.

Production During the Period:

Data which would indicate the amount of production for the period is not available, but it is known to have been 5,557,188 M. cubic feet in 1903, and 12,590,828 M. cubic feet in 1904. It is interesting to note that this large production was obtained from a total of three hundred thirty-six active wells, plus the few which were abandoned. This is ample evidence of the excellent productivity of the wells in this early period.

Reserve Added During the Period:

There are no records of production for the Company prior to 1903, and very little data is available as to the producing habits or reserves for any of the Company wells until after 1913, when the full value of this informa-

tion first became appreciated.

The reserve developed by these early wells must have been tremendous as compared to reserves that may be expected from wells drilled at the present. This conclusion is justified when we note the reserve which was still known to be available from the wells drilled prior to 1904, and still active in 1913 when reserve data is first available. The total reserve developed from wells drilled and purchased in this early period, 1887 to 1904, is estimated to have been 24,402,400,000 cubic feet still remaining to be produced in 1913. About 15,958,500,000 cubic feet of this reserve was available from operated acreage which had been purchased during the period. The remainder was developed by the Company as a result of the drilling of new wells, and a small part from drilling deeper.

Depletion and Abandonments:

Although the Company had been in existence but nineteen years at the end of 1904, some of the wells had been depleted by that time. A total of thirty-eight wells were abandoned during the period. For the most part, these wells were scattered throughout the Company's holdings, and many of them no doubt had ceased to be productive because of defective casing and poor operating methods. However, depletion of some of the areas was the cause of a considerable number of the abandonments as is shown in the Murrysville field in Franklin and Washington Townships, Westmoreland County, where about ten wells were plugged and abandoned because the gas supply was no longer sufficient to cover operating expenses.

Depletion of the gas supply had not as yet become a serious factor, although it was important enough that operators had begun to keep smaller wells than were formerly thought to be commercial.

Effect of Developments on the Company's Acreage Holdings:

Very little accurate data is available on the Company's acreage holdings prior to 1903. It is known that the unoperated acreage held by the Company was increased from 0 to 72,862 acres as a result of the new prospective areas developed by drilling during this period.

The operated acreage was also increased by 28,118 acres between 1887 and the end of 1904.

Toward the end of the period, it became increasingly evident that considerable unoperated acreage was necessary to protect the wells owned by the Company, and to have fresh supplies of gas available, as they were required by the Company's markets. As gas supplies became more valuable, it was necessary to acquire prospective acreage when it was available in order to have something in reserve to fall back upon for new production. If desirable acreage was not acquired when it became available, and carried as unoperated acreage until it was needed, the acreage was secured by competitors and developed by them.

The expansion of the Company had required a considerable investment, and since the entire investment would be lost if gas supplies could not be replenished from time to time through development of new acreage, the necessity of carrying unoperated acreage became imperative.

Although the natural gas industry was yet young, many Companies were forced to go out of business as early as this period, because they had unwisely failed to maintain an adequate amount of unoperated acreage from which to replenish their dwindling gas supplies.

During these early years of the Company's operations, production was obtained chiefly from the shallow sands as has been discussed above.

The possibility of obtaining gas from deeper drilling was not appreciated as yet; hence, the tendency was to spread out over an ever widening geographic distance as new supplies of gas were found throughout the Appalachian basin in Western Pennsylvania. Not infrequently areas were tested through the shallow sands, and on proving dry in these formations, acreage would be given up. Much of this condemned territory was later proven productive in the deeper sands when the necessity for drilling wells deeper, together with the improvement in drilling technique revealed new supplies of gas at greater depths.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY - 1905 - 1909

Statistical Summary of Operations 1905 to 1909, Inc.

<u>Producing Wells:</u>			<u>Acreage</u>	
(Active Wells)	(No. at Beg. of Period	336	Unop. Acreage Beginning of Per.	72,862.00
	No. at End of Period	528	Unop. Acreage End of Period	102,652.46
	(Net Change in Period	192	Net Change in Unop. Acreage	29,790.46
No. of Prod. Wells Drilled in Per.		147	No. Ac. Going into Opr. from Unop.	12,244.09
No. of Wells Purchased in Period		110	Operated Acreg. at Beg. of Per.	28,118.71
No. of Dry Holes Drilled		26	Opr. Acreage at End of Period	45,567.05
No. of Wells Abandoned or Sold		65	Net Change in Operated Acreage	17,448.34
<u>Data on New Wells:</u>			No. Acres Surr. During Period	
No. of New Wells Drilled		173	Operated - - - - -	3,620.00
Total Footage Drilled	452,956'		Unoperated - - - - -	38,891.62
Average Depth of Wells	2,618'		No. Acres Acquired During Per.	
			Operated - - - - -	9,088.75
			Unoperated - - - - -	82,052.80
<u>Drilling Deeper:</u>			<u>Reserve and Production Data**</u>	
No. of Wells Drilled Deeper		115	Res. from New Wells, Unop. Leases	15,568.5 ML
Total Footage from Drilg. Deeper	73,175'		Res. from New Wells, Opr. Leases	1,996.7 ML
Avg. Addtl. Footage per Well	637'		Res. from Purchased Wells	8,458.8 ML
			Res. from Drilling Deeper	3,504.6 ML
<u>Source of Production:</u>			Total Additional Reserve	29,528.6 ML
New Wells	Sands Drilled	Drilg. Deeper		
No. Tot.	To	No. Tot.		
51 29.4	30' & Above	37 32.2	Production for Period: - - - -	60,905,153 M
56 32.4	Bayard Group	32 27.8		
11 6.4	Speechley Grp.	15 13.1		
54 31.2	Bradford Grp.	31 26.9		
1 0.6	Below " Grp.	0 0.0		

*-Net Change indicated does not balance exactly with detail of Acreage turnover due to inadequate records.

(Unoperated - - - - - -1,126.63
Difference (Operated - - - - - -264.50)

** - Reserves at time of drilling are unknown. Figures shown indicate reserve still left in wells after 1913, the year when reserve data first became available.

Introduction:

The period from 1905 to 1909 is important in that it was the time interval when Pennsylvania gas fields were at their best. Production per well and reserve per well was the best in the history of the natural gas industry. The period is an important one in the history of The Peoples Natural Gas Company.

It was during this period that new fields were developed in the portions of Pennsylvania not tested before; hence we see that the general outline of the producing areas as they are today, were quite well defined by 1909. This factor in turn limited the pipe line extensions used to obtain supplies, and from this period forth, new gas was largely found within the outline of the general area defined by the end of 1909. The period is also notable for the discoveries made in deeper sands, such as the Bradford and Bayard, and for the consequent increase in percent of the number of wells drilled to the deeper producing sands and the rejuvenation of old wells which were drilled deeper. The most important phases of this period of development are discussed more fully below.

Geographic Distribution of New Areas Under Development During the Period 1905-1909

We have seen that during the period 1887 to 1904, tremendous strides were made in spreading out the discoveries of new gas pools along the Pennsylvania portions of the Appalachian Geosyncline. During the period 1909, new discoveries had a tendency to broaden out this producing belt. New Pools became available in Washington County for the first time, and likewise the Western part of Allegheny County and several pools in the Central part of Westmoreland County were brought into production. The net effect of these operations was to widen out the belt of productive areas to about fifty miles from East to West, thus expanding the Company's properties in these directions. In the Counties which had been productive prior to 1904, some new fields were discovered, and many of the previously discovered fields were extended. The

reader is referred to the map showing productive areas on Page 23, to note the development during the period and the comparison of this development with that in other periods of the Company's history.

New Fields Opened or Participated in by the Company:

A total of ten new fields became available to the Company during the period 1905 to 1909. In chronological order of availability to the Company, these fields were as follows:

New Fields Becoming Available to The Peoples Nat. Gas Company from 1905 to 1909

Year	Map#	Name	Location		No. Cos.	Dis-cov-ery	New Co. Wells in Field Dur-ing Period
Opr. Ref.		of			lst.		
By Co. No.		Field	Township	County	Well	Date	
1905	60	Waynesburg	Franklin & Center	Greene	400	1899*	7
1907	59	Woodruff	Center, Wayne & Jackson	Greene	489	1905*	10
1907	43	Delmont	Salem	Westmoreland	524	1901*	12
1908	51	Eldersville	Jefferson	Washington	575	1890*	25
			Cross Creek				
1908	48	Florence	Hanover	Washington	639	1890*	3
1908	49	Candor	Robinson & Smith	Washington	650	1890	50
			North Fayette	Allegheny			
1908	50	Burgettstown	Smith	Washington	641	1890*	6
1908	27	Imperial	Moon, Findley & North Fayette	Allegheny	604	1896	9
1908	28	Moon Run	Moon	Allegheny	589	1899	2
1909	45	Latrobe	Unity	Westmoreland	657	1907	6
							<u>130</u>

- See Map, Page 25

* - Second Geological Survey of Penna.

The above data indicates that a total of one hundred thirty new wells were added to the Company's source of supply in the ten fields operated in for the first time during the period. Many of these wells were added through purchase, but a majority of them were obtained by drilling unoperated acreage which had been carried in these areas prior to the development of the fields.

It will be noted that all but one of these fields were discovered prior to this period, but they were not operated by the Company until the period 1905 to 1909. The availability of these fields to the Company was the result of the purchase and consolidation with the Lawrence Natural Gas Company, which had properties in Jefferson, Cross Creek, Robinson and Smith Townships, Washington County and North Fayette Township, Allegheny County.

The Candor field in Washington and Allegheny County was especially noteworthy, as the Company's participation in it resulted in the addition of fifty new wells for an additional supply of gas. The Eldersville field in Washington County was also important, as twenty-five wells were added in this area. Both of these fields had been discovered much earlier than this period (1890).

The additional fields available to the Company in this period were confined to Washington, Greene, Allegheny and Westmoreland County, and although the number of wells owned by the Company in these areas were relatively few at the end of 1909, several of them were destined to become very large and important sources of gas in the future, as will be brought out in further pages of this report.

Old Fields Extended by Operations - 1905 to 1909:

In addition to the ten new fields available to the Company, seventeen of the old fields were extended by additional drilling during this period. The extensions were accomplished by the drilling or purchase of one hundred thirty new wells during this period.

The most important of the extensions was to the New Freeport Field in Springhill and Aleppo Townships, Greene County. In this field, twenty-two new wells were added to the Company's operations. The Gump and Lantz Fields in Greene County were also extended by seventeen and eighteen wells respectively.

The Goheenville field in Armstrong County was also actively expanded during the period, ten additional wells being drilled in this area.

The Greenville Field in Limestone Township, Clarion County was expanded considerably by the drilling of twelve new wells. The New Salem Field in Armstrong County was extended by nineteen wells.

The remainder of the extensions to the old fields were less important during this period. The large number of extensions which were being added as much as twenty years after the fields were discovered, is typical of the slow manner in which many of the early Pennsylvania Fields were developed.

Below is a table giving the names of the fields which were extended during the period from 1905 to 1909. It also shows the number of additional wells belonging to the Company in each of the extensions:

OLD FIELDS EXTENDED

Name of Field	Map # Ref. No.	No. of New Co. Wells in Field 1905-1909	Name of Field	Map # Ref. No.	No. of New Co. Wells in Field 1905-1909
New Freeport	63	22	Cowanshannock	16	1
Lantz	64	13	McNess	17	2
Bristoria	58	1	Goheenville	14	10
Gump	62	17	McCree Furnace	15	5
Webster	47	3	Mahoning Furnace	13	3
Murrysville	42	3	New Salem	12	19
Pine Run	40	2	Greenville	6	12
Plum Township	29	2	Frogtown	3	8
Plum Creek	22	4	TOTAL		127

Trend of Drilling During Period 1905 to 1909:

The statistical summary preceding this portion of the report indicates that the Company had 528 active wells at the end of the period. Since there were 336 active wells at the beginning of the period, a total of 192 new wells were added. Of the additional producing wells, one hundred forty-seven were drilled by the Company and one hundred ten were acquired through purchase and consolidation.

The Company drilled a total of one hundred seventy-three wells during the period, twenty-six of which were dry holes. Contrasting this record with that of the previous period when only ten dry holes were found out of two hundred fifty drilled, it is interesting to note the increase in percentage of dry holes found, indicating the increase of hazard in the search for gas.

The average depth of wells drilled during the period was 2,618 feet, which represents an increase over the previous period of 983 feet per well. These figures illustrate better than words the trend toward finding production at greater depths. The reason for the increase in depth of wells is well illustrated by the fact that only 29.4% of the wells found production in the Thirty Foot Sand or above, as contrasted to 72.8% in the previous period. The discovery of large supplies of gas in the deeper Bayard sands in Greene County during this period is reflected in the increase from 6.8% to 32.4% of Bayard sand wells, to all wells drilled. The percentage of wells drilled to the Bradford sands increased from 14.8% to 31.2%, largely due to wells drilled in the Clarion and Armstrong fields where this sand began to be an important factor during this period.

The tendency toward deeper depths for new wells is well illustrated by the following statistics:

Wells Drilled to a Depth of	0 to 1500'	- 14.0%
Wells Drilled to a Depth of	1501 to 2000'	- 11.5%
Wells Drilled to a Depth of	2001 to 2500'	- 20.5%
Wells Drilled to a Depth of	2501 to 3000'	- 23.0%
Wells Drilled to a Depth of	3001 to 3500'	- 21.0%
Wells Drilled to a Depth of	3501 to 4000'	- 10.0%

The discovery of new supplies of gas in the deeper sands, frequently in the same fields which had been developed earlier in the upper sands, resulted in an increase from thirty-nine wells drilled deeper in the first period, to one hundred fifteen wells drilled deeper in the period 1905 to 1909. The importance of the Bayard sands in Greene County and the Bradford sand in Clarion and Armstrong Counties, is brought out by the fact that 27.8% of the wells drilled deeper were drilled to the Bayard sand, and 26.9% of the drilling deepers had the Bradford sands as their objective. Thirteen and one-tenth percent of the wells drilled deeper went to the Speechley group, and the remaining 32.2% were still confined to the shallow sands above the Thirty Foot.

The importance of the discovery of additional gas in the deeper sands is illustrated in the table given below, which lists the old fields which were rejuvenated by new supplies of virgin pressure gas. The table also gives some other data pertinent to these discoveries.

WELLS DRILLED DEEPER

Tabulation Showing Gas Fields in Which Wells were Drilled Deeper for the First Time During the Period 1905 to 1909

Fields in Which Wells Had Been D.D. prior to 1905 & Were Active -1905 - 1909

Year	D.D.	Map#	Name of	Location	No.	No.Co.	Name of	Map#	No.Co.
By	Ref.		Field	Township	County	1st. D.D. in	Field	Ref.	Wells D.D.
Co.	No.					Well Field	Field	No.	in Field
						D.D. End 09			1905-09
1905	47		Webster	Rostraver	Westmoreland	240	7	Goheenville	14
1905	29		Plum Township	U. Burrell	Westmoreland	314	3	Murrysville	42
				Plum	Allegheny			Pine Run	40
1905	63		New Freeport	Springhill	Greene	395	12	Plum Creek	22
				Aleppo	Greene			McNees	17
				Jackson	Greene			McCrea	15
1905	20		Say	Plum Creek	Armstrong	92	6	Candor	49
1905	31		White Ash	Penn	Allegheny	189	2	Girty	23
1906	56		Belle Vernon	Fallowfield	Washington	252	2	Lantz	64
1906	16		Cowanshannock	Valley, Cow-Armstrong	Armstrong	350	2	TOTAL	64
1906	51		Eldersville	Cross Creek	Washington	567	1*		
				Jefferson	Washington				
1907	62		Gump	Wayne	Greene	336	4		
				Center	Greene				
				Franklin	Greene				
1907	58		Bristoria	Richhill	Greene	271	2		
				Aleppo	Greene				
				Jackson	Greene				
1907	60		Waynesburg	Franklin	Greene	442	1		
				Center	Greene				
1908	6		Greenville	Limestone	Clarion	486	2		
1908	43		Delmont	Salem	Westmoreland	532	6		
1908	3		Frogtown	Limestone	Clarion	550	1		
						TOTAL -	51		

*- See Map, Page 25

*- Well Drilled Deeper Prior to being Available to the Company.

The Goheenville field in Boggs and Wayne Townships, Armstrong County, had fifteen wells drilled deeper during the period. The drilling deeper activity was distributed over most of the field, and much of the additional production was obtained from the Tiona sand. A number of drilling deeper operations did not obtain additional production.

The drilling deeper operations in the Plum Creek field in South Bend and Plum Creek Townships, Armstrong County resulted in the deepening of fifteen wells. This activity was distributed over the field, and the additional production when obtained, was found in the Hundred Foot and Speechley sands.

The New Freeport field in Springhill and Aleppo Townships, Green County, had twelve wells drilled deeper during the period. The wells which encountered additional production found gas in the Gordon and Fourth sands.

The drilling deeper operations in the Delmont Field in Salem Township, Westmoreland County had six wells drilled deeper. The greater number of these operations were unsuccessful. Deeper production, where found, was in the Speechley Stray and Bradford sands.

Drilling deeper activity was of minor importance in other fields, with the proportion of successful operations substantially the same as in the fields described above.

Production During the Period:

The yearly production during this period was the highest in the Company's history and was as follows:

1905 - 13,980,234M	1908 - 13,416,128M
1906 - 8,531,010M	1909 - 13,215,414M
1907 - 11,762,367M	TOTAL- 60,905,153M

The noteworthy part of this large production is the fact that so few wells, (five hundred twenty-eight active at the end of the period) were capable of producing quantities of gas much larger than two times as many wells could produce in later years. It is obvious from this data that the productivity per well reached its' high point during this period. In other words, the Pennsylvania gas fields had attained their prime of life by 1909, and the decline starts from this point.

Reserve Added During the Period:

It has been stated in a former part of this report that little information is available as to the reserves added by drilling prior to 1913 when records necessary for this information were first kept. That the reserve was very large is shown by the data relating to these early wells which is available after 1913. The reserve still remaining in the wells drilled during the period 1904 to 1909 is shown to have been 29,528.6 Million Cubic Feet in 1913, and since at least half of the total production of the wells probably would have been produced by this time, it is apparent that not only the productivity per well, but also the reserve per well of those operations carried on from 1904 to 1909 was very high, again indicating the prime of life for Pennsylvania gas fields as having been reached in this period.

Of the reserves available in 1913 from wells drilled between 1905 and 1909, 8,458.8 Million was from operated acreage acquired during the period through purchased wells. The remaining 21,069.8 Million was developed from wells drilled and drilled deeper by the Company during this span of years.

Depletion and Abandonments:

The end of 1909 marked the completion of twenty-two years of activity for the Company and over so long a period it was inevitable that some of the early sources of gas should become depleted. During the time interval, 1905 to 1909, the Company found it necessary to abandon sixty-five wells. A few of these wells had become hopelessly defective as operating mediums, even though the gas was not fully exhausted, but the greatest majority of the wells were abandoned because of the depletion of the sands. Many more wells would have been abandoned if deeper supplies of gas had not been found to rejuvenate them. However, depletion was complete in some areas as is indicated on the

Map on page 23, which shows that the northern part of the Ford City Pool was taken out of operation in this period, the wells having become too small for commercial production. The Western portion of the Pine Run field in Washington and Westmoreland Counties was abandoned during this period. The Murrysville field in Franklin Township, Westmoreland County was partially abandoned during the years 1904 to 1909. A small portion of the northern part of the New Freeport field in Greene County was abandoned during the period. In addition to those larger areas being abandoned, several of the fields in Jefferson and Armstrong Counties, chiefly in the New Salem, Mahoning Furnace, McCrea Furnace, Coheenville, Say and Plum Creek fields were showing an increasingly large number of abandonments. In Westmoreland County, the Delmont Field in Salem Township was on the downward trend. In the aggregate, 3,620 acres were depleted and surrendered during this period in the various fields mentioned above.

Effect of Developments on the Company's Acreage Holdings:

The early record of the Company indicates that they had 72,862 acres of unoperated acreage at the beginning of 1905. During the period, 1905 to 1909, the Company leased an additional 82,053 acres, which appeared attractive as operations progressed, and 38,891 acres were surrendered, as it became evident from dry holes drilled by the Company and outside interests, that the acreage was not apparently attractive. In addition to these surrenders of unoperated acreage, 12,244 acres of unoperated acreage was developed during the period by drilling. After this sifting process had taken place, the Company's books indicate that 102,652 acres of unoperated

acreage was being held for future operations as of the end of 1909. This represents a net gain of 29,790 acres being held for future development from the beginning to the end of the period.

In 1905, the Company had 28,119 acres in operation, and during the five year interval to 1909, 12,244 additional acres became operated as the result of drilling and 9,089 acres were acquired through purchase of producing properties. There were 3,620 acres of operated acreage surrendered due to depletion or sale; thus the Company had a balance of 45,567 acres, which were operated at the end of 1909.

The above figures illustrate more eloquently than words, the constant sifting process which the Company's acreage was undergoing, even at this early period when new gas supplies were not difficult to find. From these figures, it is apparent at a glance that the Company was able to maintain its' supply of gas only by a constant attention to the business of acquiring new acreage. It also shows how much acreage must be carried from time to time in order to assure an adequate amount of eventually proven gas territory. During the period, 1905 to 1909, the Company drilled twenty-six dry holes, all of which condemned a considerable amount of unoperated acreage which had previously been held for its' potential gas supply value. As proven areas became condemned by the Company's own operations and those of outside operators, it became necessary to be constantly on the lookout for new areas where previous drilling had not condemned the region. This factor together with the proving of new areas by new drilling, accounted for the large acquisitions of new unoperated acreage which was acquired with an eye to the future.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY - 1910 - 1914

Statistical Summary of Operations 1910 to 1914, Inc.

Producing Wells:

(No. at Beg. of Period	528	Unop. Acreage Beginning of Per.	102,652.46
(Active Wells) No. at End of Period	742	Unop. Acreage End of Period	205,222.43
(Net change in Period	214	Net Change in Unop. Acreage	102,569.97*
No. of Prod. Wells Drilled in Per.	227	No. Ac. Going into Opr. from Unop.	14,250.46
No. of Wells Purchased in Period	64	Operated Acreage at Beg. of Per.	45,567.05
No. of Dry Holes Drilled	34	Opr. Acreage at End of Period	58,545.32
No. of Wells Abandoned or Sold	77	Net Change in Operated Acreage	12,978.27*
		No. Acres Surr. During Period	

Data on New Wells:

No. of New Wells Drilled	261	Operated - - - -	5,251.35
Total Footage Drilled	685,604'	Unoperated - - - -	84,859.68
Average Depth of Wells	2,638'	No. Acres Acquired During Per.	
		Operated	4,081.16
		Unoperated	202,357.11

Drilling Deeper:

No. of Wells Drilled Deeper	84	Reserve and Production Data:**	
Total Footage from Drlg. Deeper	71,417'	Res. from New Wells, Unop. Leases	27,373.1ML
Avg. Addtl. Footage per Well	850'	Res. from New Wells, Opr. Leases	9,578.5ML
		Res. from Purchased Wells	6,524.8ML
		Res. from Drilling Deeper	8,973.3ML
		Total Additional Reserve	52,449.7ML

Source of Production:

New Wells	Sands Drilled	Drlg. Deeper
No. %Tot.	to	No. %Tot.
54 20.7	30' & Above	17 20.2
70 26.8	Bayard Group	31 36.9
41 15.7	Speechley Grp.	7 8.3
93 35.6	Bradford Grp.	27 32.2
3 1.2	Below "	2 2.4
7 - One "No Record" Well		

Production for Period: - - - - 45,133.623M

*- Net change indicated does not balance exactly with detail of acreage turn-over due to inadequate records:

(Unoperated	-677.00
Difference (Operated	-102.00

** - Reserves at time of drilling are unknown. Figures shown indicate reserve still left in wells after 1913, the year when reserve data first became available.

Introduction:

The period from 1910 to 1914 is a rather uneventful one in the history of The Peoples Natural Gas Company. It marks an era of time, when, so to speak, the Company "marked time". There were fewer consolidations with outside Companies during this period than in any previous one.

Expansion of drilling operations was confined well within the geographic limits outlined at the beginning of the new period. The Company did develop

and acquire producing properties in fields not formerly operated, but in the main, these were close to fields in which development had already taken place.

There was a marked falling off in production during this time interval, this being due to a tendency to drop some of the industrial loads which could no longer be supplied at the cheap rates which prevailed during the earlier periods when new gas supplies were readily and cheaply developed. During this period, the production per well dropped steadily, and it was necessary to drill a great many more wells than previously to produce the same amount of gas.

There was, of course, no way of foreseeing the unusual demands which were soon to be made upon the industry by the war period which was just ahead. However, the need for future gas supplies was becoming more evident, as it became more difficult to produce large quantities of gas from individual wells, and the warning was heeded by the Company's management, as is reflected in the large increase in unoperated acreage acquired by the Company during the period. The Company's holdings were doubled, and were in excess of 200,000 acres by 1914. As will be seen in the chapter discussing the next period, the acquisition of the acreage was fully justified by the demands soon to be made on the industry. The most important developments and trends of the period are discussed below.

Geographic Distribution of New Areas Under Development During the Period 1910-1914

All of the new fields available to the Company during this period were located well within the general outlines of the productive regions established prior to 1910. Most of the new developments which were removed from former production by any material distance, were in Allegheny County, where the

central part of the County first became operated at this time. In the Eastern part of Allegheny County, important extensions found during this period brought this section into prominence for the first time. Substantial extensions were also made in Southern Armstrong County, and in the Eastern part of Clarion County. The reader is referred to the Map on Page 23 on which the development during the period is plotted on the map showing development to the end of 1914.

New Fields Opened for Participated in by the Company:

A total of eleven new fields were participated in by the Company for the first time during the years 1910 to 1914. In chronological order of availability to the Company, these fields were as follows:

New Fields becoming Available to The Peoples Nat. Gas Company from 1910 to 1914

Year	Map [#]	Name of	Location		No.	Dis-	New Co.
lst.	Ref.	Field	Township	County	Cos.	Cov-	Wells in
Opr.	No.				1st	ery	Field Dur-
ByCo.					Well	Date	ing Period
1910	21	Shellhammer	Burrell, So.	Armstrong	673	1899°	7
			Bend, Plum Crk.	Armstrong			
1910	33	Carnegie	Colliers, Mt.	Allegheny	692	1900°	24
			Lebanon & Scott	Allegheny			
1910	26	New Sheffield	Independence	Beaver	704	1881°	3
1910	4	Shamburg	Limestone &	Clarion	691	1888°	11
			Munroe	Clarion			
1911	24	Roaring Run	Kiski	Armstrong	807	1894°	19
1911	41	Bell Twp.	Bell	Westmoreland	832	1900°	3
1912	52	Hickory	Mt. Pleasant	Washington	783	1882	1
1912	5	Kiefer	Munroe &	Clarion	854	1912	3
			Limestone	Clarion			
1912	32	Clugston	Plum & Patton	Allegheny	845	1912	1
1913	44	Grapeville	Hempfield	Westmoreland	896	1900°	12
		Arona	Hempfield	Westmoreland			
1913	36	McMurry	Peters	Washington	937	1894°	4
			Snowden & Bethel	Allegheny		TOTAL	88

[#] - See Map, Page 25

* - Penna. Geol. Survey, Fourth Series, Bulletin M-19

The most significant thing about the above data, is the lesser number of wells resulting from fields available to the Company for the first time during the period. As will be noted above, only eighty-eight wells were drilled as the result of these fields. This represents a downward change of approximately 30% from the last period, indicating that the areas in which the Company operates are no longer yielding numerous new flush fields. The Map on Page 23 shows the extent of operations during this period.

It is also noteworthy that only two of the fields becoming available to the Company for the first time during this period were actually discovered during this time interval. The two fields which were discovered were the Kiefer Field in Monroe and Limestone Townships, Clarion County, and the Clugston field in Plum and Patton Townships, Allegheny County. There was very little development in either of these fields during the period.

The Carnegie field in Allegheny County was the most active of the new fields available to the Company. There were twenty-four wells drilled in this field to the end of 1914.

The Roaring Run field in Kiski Township, Armstrong County was also active during the period, there being nineteen new wells drilled or purchased in this area.

The Shamburg field in Clarion County and the Grapeville-Arona field in Westmoreland County were both moderately important, contributing eleven and twelve new wells respectively. Other new fields were of minor importance taken separately, but did contribute considerable to the Company's gas supply when taken in the aggregate.

Old Fields Extended by Operations - 1910 to 1914:

The following table shows the number of old fields which were extended during the period, together with the number of new wells drilled in the field.

OLD FIELDS EXTENDED

Name of Field	Map [#] Ref. No.	No. of New Co. Wells in Field 1910 - 1914	Name of Field	Map [#] Ref. No.	No. of New Co. Wells in Field 1910-14
New Freeport	63	18	Murrysville	42	10
Lantz	64	12	Latrobe	45	10
Woodruff	59	2	Delmont	43	4
Gump	62	6	Pine Run	40	9
Waynesburg	60	2	Girty	23	14
Eldersville	51	2	Plum Creek	22	1
Burgettstown	50	7	Goheenville	14	5
Florence	48	2	New Salem	12	4
Candor	49	4	Shannondale	7	3
Plum Township	29	30	Greenville	6	14
			Frogtown	3	44

TOTAL 203

- See Map, Page 25

There were twenty-one fields which had been operated by the Company prior to 1910, in which operations were extended during the time interval from 1910 to 1914. Many of these were of minor importance, the outstanding fields from the viewpoint of drilling activity were the Frogtown, New Freeport, Greenville, Plum Township, Lantz, Girty, Murrysville and Latrobe areas.

The Frogtown field in Limestone Township, Clarion County was the most active field in the area, a total of forty-four new wells having been drilled. This activity was due to the development of the Sheffield sand

which had been proven in the previous period by several scattered wells in the field, most of which were good producers in this sand. During the period from 1910 to 1914, the field was developed between the proven producers which had been more scattered prior to 1910.

The Greenville field, located near the Frogtown field, was extended by eighteen wells for the same reasons.

The Plum Township field in Allegheny and Westmoreland Counties was extended by thirty new wells drilled in this area during the period. The incentive for the drilling of new wells in this area was the discovery of good flows of gas in the Fourth and Fifth sands in previously unproven portions of the field to the Northeast and Southwest.

In Green County, the Lantz field and the New Freeport field were extended by new operations to the extent of twelve and eighteen wells respectively. These wells were drilled because of the good results found in the numerous sands from the Big Injun to the Bayard Stray in these areas.

The Girty field in Armstrong County was extended by fourteen new wells as a result of an extension to the Southwest, the majority of which wells were purchased from the Conemaugh Gas Company.

The Murrysville Field in Westmoreland County, which was the first field operated by the Company was still quite active in this period, there being a total of ten new wells drilled in the area. Most of these wells were drilled as a result of an extension of the producing area to the Northwest.

The Latrobe field which was discovered during the period just previous to 1910 was extended by ten new wells up to 1914. The extension developed the field in a Northeast and Southwest direction and materially enlarged the producing area.

There was a total of two hundred two producing wells added to the Company's holdings as a result of operations and purchased wells in old fields. This is the first period in the Company's history when extension wells accounted for a substantial majority of all the expansion in operations. Thus, we have another barometer of the static stage of development during this span of time.

Trend of Drilling During Period 1910 to 1914:

A glance at the Statistical Summary of Operations preceding this part of the report will show that the Company had seven hundred forty-two active wells at the end of 1914, or a net increase of two hundred fourteen since the end of the preceding period (1909). To obtain the increase of two hundred fourteen wells, it was necessary for the Company to drill two hundred twenty-seven producing wells and to purchase sixty-four wells - there being seventy-seven of the formerly active wells abandoned during the period.

There was a total of two hundred sixty-one wells drilled by the Company from 1910 to 1914, inclusive. Of this number, thirty-four were completed dry holes. The percentage of dry holes during this period did not greatly exceed that during the preceding period. This result no doubt reflected the lack of any active wild-cattling during this relatively quiet period in the Company's history.

The average depth of wells drilled during this time interval was 2,638 feet, or only slightly over that of the previous period, which was

2,618 feet. This relatively small increase of depth of wells again illustrates the tendency of this period in the Company's history to be one when exploratory activities were quiet. However, the tendency to obtain gas in the deeper producing horizons was continued into this period of development, and the percentage of wells drilled to the Thirty Foot and above was only 20.7%, as contrasted to the last period of development, which showed a figure of 29.4% of its wells drilled to the Thirty Foot horizon or above.

The percentage of wells going to the Bayard Group dropped somewhat during this period, because of the relative inactivity of the Greene County and Washington County portions of the Peoples Natural Gas Company operations.

The percentage of wells drilled to the Speechley group increased from 6.4% to 15.7%. This was largely due to developments in the Northwest portion of Westmoreland County, and the Southern portion of Armstrong County, as well as a few wells in the Eastern part of Allegheny County.

Thirty-five and six-tenths percent of the wells drilled were carried to the Bradford group of sands, as contrasted to 31.2% in the previous period. For the first time, more than one well was drilled by the Company to horizon below the Bradford group.

Some idea of the depth to which wells were drilled during this period is obtained from the following statistics:

Wells Drilled to a Depth of	0 to 1500'	- 8.25%
Wells Drilled to a Depth of	1501 to 2000'	- 6.10%
Wells Drilled to a Depth of	2001 to 2500'	- 35.85%
Wells Drilled to a Depth of	2501 to 3000'	- 15.05%
Wells Drilled to a Depth of	3001 to 3500'	- 21.15%
Wells Drilled to a Depth of	3501 to 4000'	- 11.45%
Wells Drilled to a Depth of Below	4001'	- 2.15%

There were fewer wells drilled deeper during this period than in the period preceding. A total of eighty-four wells were drilled deeper during the period. Of this group, the largest percentage going to any one horizon was to the Bayard group of sands, being a total of 36.9%. Eight and three-tenths percent were drilled to the Speechley group, and 32.2% were drilled to the Bradford group. As was the case with the new wells drilled, the tendency to drill even below the Bradford horizon was indicated by the fact that 2.4% of the wells drilled deeper went below this horizon.

A tabulation showing the fields in which drilling deeper occurred for the first time, together with another tabulation which shows the fields other than those in the latter classification in which drilling deeper occurred, will be found below:

WELLS DRILLED DEEPER

Tabulation Showing Gas Fields in Which
Wells were Drilled Deeper for the First
Time During the Period 1910 to 1914

Fields in Which Wells had
Been D.D. Prior to 1910 &
Were Active - 1910-1914

Year	D.D.	Map#	Name of	Township	County	No. Cos.	No. Co.	Name of	Map#	No. Co.
By	Ref.	No.	Field			1st.	D.D. in	Field	Ref.	Wells
Co.	No.					Well	Field	Field	No.	in Field
						D.D.	End 14			1910-14
1910	45	Latrobe	Unity	Westmoreld.		666	5	New Freept.	63	11
1910	43	Delmont	Salem	"		551	1	Bristoria	58	1
1910	26	New Sheffield	Indepndnce	Beaver		707	1	Lantz	64	8
1910	59	Woodruff	Center	Greene		529	2	Waynesburg	60	1
			Jackson	Greene				Eldersville	51	1
			Wayne	Greene				Candor	49	4
1911	33	Carnegie	Collier	Allegheny		912	5	Murrysville	42	8
			Scott	Allegheny				Plum Town.	29	3
1912	21	Shellhammer	Burrell	Armstrong		726	2	Pine Run	40	5
			So. Bend	Armstrong				Girty	23	9
			Plum Creek	Armstrong				Plum Creek	22	5
1913	13	Mahoning-Furnace	Mahoning	Armstrong		286	1	Goheenville	14	5
			Fur					Gump	62	3
1913	6	Greenville	Limestone	Clarion		959	1	TOTAL		64
1914	24	Roaring Run	Kiski	Armstrong		819	2			
						TOTAL	20			

See Map, page 25

Of the fields where drilling deeper operations were active, the following are the most important.

The Latrobe field in which five wells were drilled deeper, the majority of which found production in the Thirty Foot sand after formerly having produced in the Murrysville sand, and the Carnegie field in Collier and Scott Townships, Allegheny County, where five wells were drilled deeper to the Gordon Stray sand, having formerly produced in the Maxton sand. From the group of fields where drilling deeper had previously been started, the New Freeport and Lantz fields in Greene County, and the Murrysville field in Westmoreland County, and the Girty field in Kiski Township, Armstrong County, were again quite active during this period.

Production During the Period:

The yearly production from 1910 to 1914 was as follows:

1910 - 9,570,665M	1913 - 10,963,966M
1911 - 7,414,355M	1914 - 9,382,830M
1912 - 7,801,806M	

Total - 45,133,622M

The above figures indicate a decrease of 15,781,531 M. cubic feet of gas from the production during the preceding five years which ended in 1909. This tremendous decrease in production, representing about 25% less gas produced than in the previous five years, was the penalty which the Company paid for its relatively quiet period of operations. This decrease also reflects the loss of markets where gas was being used for industrial purposes. Many of the markets which were less lucrative were dropped during this period, as it was no longer possible to produce gas cheaply enough to supply these lower priced consumers.

It is of interest to note that this large decrease in production took place despite the fact that the Company had two hundred fourteen more active wells at the end of 1914 than they had at the end of 1909. This fact illustrates the trend of lower productivity per well which becomes much more pronounced during each succeeding period, the wells having reached their prime on a production per well basis prior to 1909.

Reserve Added During the Period:

The reserve data available at the present is still not complete at this time. However, there is more information available for this period than for any of the preceding periods. From the records available, it seems probable that the Company developed a total additional reserve of about 52,449.7 Million Cubic feet. This is slightly in excess of the production during the period. Of this reserve, 6,524.8 Million cubic feet was obtained through purchased wells; 8,973.3 Million cubic feet was developed by drilling deeper, and the remainder was developed by drilling new wells - 27,373.1 Million cubic feet having been obtained from wells drilled on previously unoperated leases and 9,578.50 Million cubic feet coming from wells drilled on operated leases. The reserve per new well drilled during this period was probably in excess of 140 Million cubic feet.

Depletion and Abandonments:

After twenty-seven years of activity, it is only natural that there would have been depletion in some of the earlier gas fields. The depletion for this period is reflected in the fact that the Company abandoned seventy-seven wells during this period. This is a slight increase over the number abandoned or sold in the previous five years, which was sixty-five. Abandonments became more frequent in Greene County, and there was also a noticeable

increase in depletion of some of the older fields in Armstrong County. Depletion in these two areas accounted for most of the abandonments during the period. A glance at the Map on page 23, will indicate the location of the fields in which abandonments were taking place at this time. One small field in Independence Township, Beaver County was first operated and also abandoned during this period, as the gas did not have good staying qualities in this area. There were 5,251 acres surrendered because of depletions as a result of the above described abandonments.

Effect of Developments on the Company's Acreage Holdings:

The Company had 102,652 acres of unoperated leases at the beginning of this period. This was approximately doubled during the period, as will be noted from the figure of 205,222 acres at the end of 1914. Actually there were 202,357 acres of unoperated leases acquired during the period, but as operations progressed, and some of the acreage which had previously been acquired, together with acreage which had been obtained during the period, was condemned by drilling operations conducted by the Company or others, 84,859 acres were surrendered. Thus, we see the sifting of acreage holdings which is so essential to a Gas Company in order that they may maintain a back-log of undeveloped acreage which has value for potential supplies of gas.

There were 14,250 acres transferred from unoperated to operated acreage as a result of drilling during the period, and 5,251 acres of operated leaseholds were surrendered because of depletion or sale.

The Company had 45,567 acres of operated leaseholds at the beginning of the period, and as a result of the above described manipulations, they had 58,545 acres at the end of the period. This represents the largest

amount of unoperated, as well as of operated acreage which the Company had at any time up to 1914, during its history.

The large increase in acreage holdings of the Company is one of the outstanding features of the period 1910 to 1914. This tendency to acquire a large amount of undeveloped acreage was undoubtedly the result of the noticeable decrease in the supply of gas which the Company was able to obtain, as is reflected in the production figures for the period. The failure of the gas supply pointed out to the management of the Company during that period, the great necessity of maintaining an adequate amount of undeveloped acreage. The acquisition of this acreage was the most important single factor in the Company's operations with respect to their future, as will be noticed in the history of the next period, which is the war period when enormous demands were made on the natural gas industry. This tremendous amount of unoperated acreage was the greatest contributing factor to the Company's ability to meet the demands of the strenuous period just ahead.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY - 1915 - 1919

Statistical Summary of Operations 1915 to 1919 Inc.

Producing Wells:

(No. at Beg. of Period	742	Unop. Acreage Beginning Per.	205,222.43
(Active Wells (No. at End of Period	1,188	Unop. Acreage End of Period	302,542.98
Net Change in Period	446	Net Change in Unop. Acreage	97,320.55*
No. of Prod. Wells Drilled in Per.	516	No. Ac. Going into Opr. from Unop.	34,255.50
No. of Wells Purchased in Period	66	Operated Acreage at Beg. of Per.	58,545.32
No. of Dry Holes Drilled	112	Opr. Acreage at End of Period	85,841.15
No. of Wells Abandoned or Sold	136	Net Change in Operated Acreage	27,295.83*
		No. Acres Surr. During Period-	

Data on New Wells:

No. of New Wells Drilled	628	Operated - - - - -	7,925.50
Total Footage Drilled	1,728,626	Unoperated - - - - -	69,421.58
Average Depth of Wells	2,756	No. Acres Acquired During Per.	
		Operated - - - - -	1,751.83
		Unoperated - - - - -	198,790.31

Drilling Deeper:

No. of Wells Drilled Deeper	90	Res. from New Wells, Unop. Leases	54,695.4M
Total Footage from Drlg. Deeper	108,530	Res. from New Wells, Opr. Leases	10,879.9M
Avg. Addtl. Footage per Well	1,206	Res. from Purchased Wells	5,272.6M
		Res. from Wells Drilled Deeper	3,912.9M
		Total Additional Reserve	74,760.8M

Source of Production:

New Wells	Sands Drilled	Drlg. Deeper		
No. % Tot.	To	No. % Tot.		
103 16.4	30' & Above	10 11.3		
112 17.8	Bayard Group	21 23.3		
96 15.8	Speechley Grp.	10 11.1		
310 49.4	Bradford Group	47 52.3		
7 1.1	Below "	2 2.2		

Reserve and Production Data:

Production for Period: - -	63,368.858 M
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*- Net change indicated does not balance exactly with detail of acreage turnover due to inadequate records.

(Unoperated	42,207.32
Difference (Operated	-786.00

INTRODUCTION:

The time interval from 1915 to 1919 is one of the most interesting in the Company's history. This covers the entire war period when exhausting demands were made on the natural gas industry. The period is, therefore, one of great activity in all branches of development.

In order to maintain the large production which was required from the Company, it was necessary to drill more than twice as many wells during this period than in any five year period in the history of the Company. A

total of 628 wells were drilled, 66 purchased, and, after deducting the abandonments and dry holes during the period, this left an addition to the Company's system of 446 active wells. A total of thirteen new fields became available to the Company during this period, and there were 32 of the older fields in which more or less important extensions were made. It is interesting to note, however, that despite all the drilling activity of the Company and others, the new fields were confined within the general outline of the production area as shown at the end of 1914.

The Company produced a total of 63,368,858,000 cubic feet of natural gas during the period. This is the highest in any five year period of which the Company has a record and was approximately 18 billion more than in the period ending in 1914. However, nearly as much gas was produced during the five year period ending in 1909, although the Company at this time had only about half as many wells as they had during the period 1915 to 1919.

Because of the exceedingly large number of drilling operations, there was a tremendous amount of unoperated acreage acquired during this period. Approximately 198,790 acres were added to the acreage held at the beginning of the period. However, 69,422 acres were surrendered as a result of the large amount of area which was proven or disproven by the extensive operations during the period. The amount of acreage handled by the Company during this period illustrates the importance of unoperated acreage in developing quick new supplies of gas in time of need.

By the end of this period, the entire area in which The Peoples Natural Gas Company operates was practically fully developed. From 1919 to the present time, there have been very few new fields found. Occasionally a small field of limited area has been located.

Geographic Distribution of New Areas Under Development During the Period.

A glance at the map on page 23 shows graphically the amount of development which took place in the various Counties in which the Company operated during this very active period. It is of interest to note from this map that the general outlines previously defined as the limits of production were not greatly enlarged despite the development which took place during this period. There was some expansion in Westmoreland and Allegheny Counties. There were also several new producing areas added to the Company's proven holdings in the Eastern part of Washington County, this area becoming of importance as a source of gas for the first time during this period. For the most part, the tremendous amount of drilling development during this time interval is expressed by extensions to old fields, this being particularly true in Clarion and Greene Counties.

New Fields Opened or Participated in by the Company 1915 to 1919, Inc.

There were thirteen new fields in which the Company operated for the first time during the period 1915 to 1919. However, only two of these fields were discovered within the period. The remainder were discovered in earlier years, but the Company did not have any wells in them because of not having acreage or for other reasons, until the period now being discussed.

NEW FIELDS BECOMING AVAILABLE TO THE PEOPLES NATURAL GAS CO. FROM 1915 to 1919, INC.

Year First Oper. By Co.	Map** Ref. No.	Name of Field	L O C A T I O N		No. Cos. First Well	Discov- ery Date	New Company Wells in Fld. During Period
			Township	County			
1915	35	McKeesport	Versailles	Allegheny	1040*	1915	28
1915	1	Clarion	Clarion & Monroe	Clarion	1026	1888#	12
1916	11	Little Mud Lick	Red Bank	Armstrong	1253	1894#	3
1916	54	Finleyville	Peters	Washington	1174	1894#	1
1917	2	Manor	Monroe	Clarion	1257	1888#	1
1917	9	Buttenbender	Porter	Clarion	1255	1865#	1
1917	19	Atwood	Washington Plum Creek	Indiana Armstrong	1193	1890#	4
1917	55	Somerset	Nottingham Somerset	Washington	1347	1900#	7
1818	10	New Bethlehem	Red Bank Porter	Clarion	1428	1917#	13
1919	38	Elizabeth	Jefferson	Allegheny	1722	1890#	11
1919	37	Lincoln	Lincoln	Allegheny	1708	1901	15
1919	34	Mifflin	Jefferson Mifflin	Allegheny	1729	1903	15
1919	39	Forward	Forward	Allegheny	1747	1900#	1
						Total	112

*1915 Production from 100' - 1919 Production from Speechley.

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**See Map Page 25.

The number of wells resulting from fields available to the Company for the first time in this period showed an increase of approximately twenty-one percent over the preceding period. The total number of producing wells resulting from these new fields was 112. The increase in the number of wells available was due to the greater number of wells drilled in the individual fields, together with a noticeable increase in the number of fields operated by the Company for the first time. There were 13 new fields available during the period as compared to 4 new fields in the preceding period.

As was the case in the preceding period, only two of the fields becoming available to the Company for the first time during this period were actually discovered during this time interval. These were the McKeesport field in Versailles Township, Allegheny County and the New Bethlehem field in Red Bank and Porter Townships in Clarion County. Both of these fields were extensively developed during this period.

The McKeesport field in Allegheny County was the most active of the new fields available to the Company with 28 wells drilled and purchased during the period. This field experienced two stages of development. The first came in 1915 when gas was discovered in 100' horizon. The second and more intensive stage began in 1919 when gas was discovered in the Speechley horizon. This discovery precipitated a wild drilling boom and town lot development of the promotional variety which is too well known to comment on.

The Lincoln Field in Lincoln Township, Allegheny County and the Mifflin Field in Mifflin and Jefferson Townships, Allegheny County were also of considerable importance, each being responsible for 15 new wells. These wells were purchased in 1919 from the Rock Run Fuel and Gas Company.

The New Bethlehem Field in Clarion County and the Clarion Field in Clarion and Monroe Townships, Clarion County were moderately active during the period, contributing 13 and 12 wells respectively, all having been drilled by The Peoples Natural Gas Company.

The Elizabeth field in Jefferson Township, Allegheny County was also an important field, contributing 11 new wells to the Company, all of which were purchased from the Rock Run Fuel & Gas Company in 1919.

The remaining new fields were of minor importance individually, but

their combined production materially increased the Company's supply.

Old Fields Extended by Operations 1915 to 1919

The following table shows the number of old fields which were extended during the period, together with the number of new wells drilled in the field:

OLD FIELDS EXTENDED

Name of Field	Map Ref. No.	No. of New Com- pany Wells in Field 1915 to 1919	Name of Field	Map Ref. No.	No. of New Com- pany Wells in Field 1915 to 1919
New Freeport	63	9	Frogtown	3	60
Lantz	64	36	Shamburg	4	48
Woodruff	59	7	Kiefer	5	31
Gump	62	12	Greenville	6	58
Waynesburg	60	14	New Salem	12	2
Belle Vernon	56	17	Goheenville	14	2
McMurry	36	13	McNees	17	4
Grapeville-Arona	44	52	Plum Creek	22	2
Latrobe	45	12	Shellhammer	21	2
Delmont	43	2	Girty	23	4
Carnegie	33	1	Roaring Run	24	7
Imperial	27	5	Bell Township	41	5
Candor	49	3	Pine Run	40	10
Burgettstown	50	12	Murrysville	42	8
Eldersville	51	1	Plum Township	29	23
Florence	48	2	Clugston	32	6

6- See Map, Page 25

Total 470

The Company extended its operations in the period 1915 to 1919 in 32 of the fields which had been operated by the Company prior to this period. The total number of new wells made available to the Company by these operations was 470. This figure included both drilled and purchased wells.

The greatest activity took place in the Frogtown, Greenville, Grapeville-Arona, Shamburg, Lantz and Kiefer areas. The most intensive drilling took place in the area of the Frogtown Field, in Limestone Township, Clarion County, where a total of 60 new wells were drilled. The drilling was confined to a

zone surrounding the proven producing area, where the Speechley, Tiona and Balltown sands accounted for most of the production.

The Greenville Field which adjoins the Frogtown Field on the South was extended by 58 wells, the majority of which were to the South of the previously developed Field. Most of the production was from the Speechley, Tiona and Balltown Sands.

The activity in the Grapeville-Arona area in Hempfield Township, Westmoreland County, may be divided into two sections. The first was a southwesterly extension of the previously productive field. The second was in an area in the southeastern portion of the Township a considerable distance from the original field. There were a total of 52 new producing wells in the area. The production in the extension of the older section of the field was from the 30', Speechley Stray and Balltown Sands, while the production in the southeastern section of the area was from the Speechley and Balltown Sands.

The Shamburg Field in Monroe and Limestone Townships, Clarion County was extended to the northeast by the drilling of 46 new wells and the purchase of two wells. The Major portion of the activity was confined to development in and around the previously proven areas.

The Lantz Field in Gilmore and Wayne Townships, Greene County was extended by 36 new producing wells. The majority of these were between scattered producing areas which had been proven in previous periods. Production from the Big Injun and Bayard group of sands was largely responsible for the activity.

The Kiefer Field in Monroe and Limestone Townships, Clarion County was quite active in this period. The development consisted largely of a major extension to the field to the southwest. Thirty-one new pro-

ducing wells became available to the Company as the result of this activity. The production was chiefly from the Speechley, Tiona and Balltown Sands.

The Plum Township Field, located in Plum Township, Allegheny County and Upper Burrell Township, Westmoreland County was extended by 23 new wells in the period. The geographic extension of the field was in a north-east and southwest direction. The production was from the Bradford Sand.

The most active of the remaining fields were as follows: Belle Vernon, 17 wells; Waynesburg, 14 wells; McMurry, 13 wells; Cump, Burgettstown and Latrobe with 12 wells each and Pine Run with 10 wells.

The Belle Vernon Field in Fallowfield Township, Washington County was extended southwest into West Pike Run Township and Centerville Boro. This extension was due to discovery of gas in the 5th., Bayard and Bayard Stray Sands.

The development of the other fields was confined chiefly to production found between previously proven areas. This development individually was not important, but did contribute materially to the Company's gas supply.

Trend of Drilling During Period 1915 to 1919, Inc.

As has been stated above, the period from 1915 to 1919 witnessed the greatest drilling activity which took place at any time during the history of the Company. The Company had 742 active wells at the beginning of the period and this was increased to 1188 by the end of the period. In order to obtain these additional producing wells, it was necessary for the Company to drill 516 producing wells and to purchase 66 wells. The total number of active wells was diminished by 136 on account of abandonments or sale. The Company drilled a total of 628 wells during the period of which 112 were dry and 516 producers. This represents a slight increase in the

percentage of dry holes. However, it is not as great as might have been expected at a time when drilling activity went on at such a feverish pace. The percentage of dry holes was no doubt kept down as a result of the large amount of good quality proven unoperated acreage which the Company had acquired prior to the beginning of this period. This acreage had been held in reserve for just such an emergency as the war period presented and if it had not been for this back-log of good unoperated acreage, it is very doubtful if the Company would have been able to maintain the large production which was necessary during the period. It is certain that a great many more dry holes would have resulted if the unoperated acreage which the Company had available had not been carefully sifted in prior years.

During this period, the average depth of wells was 2756'. This is a greater average depth than in the preceding period, again confirming the trend of seeking gas from deeper and deeper horizons. In the preceding period the average depth of wells drilled was 2638', indicating an increase of about 100' per well. In the first period described in the report, which included operations up to 1904, the average depth of wells drilled was only 1735'. The increase per well is thus shown to be approximately 1000', or about 60%.

Substantiating the deeper average depth of wells, the trend of obtaining gas from deeper horizons was continued during the period. Only 16.4% of the wells drilled obtained their objective in any of the sands from the 30' or above. This is a smaller percentage of completions in these shallow horizons than at any time during the history of the Company. There was a noticeable drop in the number of wells going to the Bayard Group or above. This producing horizon is most important in Greene and Washington Counties,

and in these areas considerable gas is found in the sands above the Bayard, and since there was such an evident need for all gas developed, wells in this area were not drilled to the Bayard at this time.

15.3% of the wells drilled during the period 1915 to 1919, went to the Speechley Group of Sands. The discovery of gas in the Speechley horizon in the McKeesport Field accounted for the majority of the wells going to this horizon.

49.4% of the wells drilled by the Company were drilled to the Bradford Group of Sands. This represents a material increase in the number of wells going to this deeper horizon, as only 35.6% of the wells drilled to the Bradford in the period prior to 1914. The large number of wells going to the Bradford horizons is due to the tremendous activity in developing extensions to fields such as the Frogtown and Greenville fields in Clarion County. This field alone accounted for 118 new wells during the period. The tendency to drill wells below the Bradford horizon was continued in this period. However, it was still an unimportant source of gas as only 1.1% of the wells drilled were drilled below the Bradford.

An interesting development of this period which was to have an important effect many years later was the completion of the first very deep well by the Peoples Natural Gas Company. This well was drilled on the Geary farm in Washington County and was completed in March, 1917, after having been in the process of drilling for 5-1/2 years. This well represents the first effort to find gas in the sands below the Upper Devonian series. The well was drilled to the Niagara formation and penetrated the Oriskany sand in which salt water was found. This well held the record as the deepest in the world for a number of years.

The interest in obtaining gas in the Oriskany and Medina was responsible for the location of a well near Ligonier by the Company. This well was not completed during the period and will be discussed later in the report.

Statistics on the depths to which wells were drilled during this period are indicated by the following: Wells drilled to a depth of 0-1500' - 4.7%; 1501-2000' - 5.8%; 2001-2500' - 29.8%; 2501-3000' - 20.3%; 3001-3500' - 24.2%; and 3501-4000' - 13.3% and 4000' and below - 1.9%.

Although there was a large increase in the number of new wells drilled during the period, this tendency was not carried out in drilling deeper operations. There were only 90 wells drilled deeper during this period, which represents an increase of only six over that of the previous period.

The principal reason for not drilling more wells deeper at this time in the Company's history was that there was such a demand for gas that the Company could not afford to waste the gas which still remained in the upper sands during the time of deeper drilling operations. It is also true that many of the wells which the Company had at the beginning of the period had already been drilled deeper prior to this time and the new wells which were drilled during the period were still too productive and too badly needed to take them out of production long enough for any drilling deeper operations. Drilling deeper operations, while they usually offer good additions to reserve, do not represent material additions to the potential flow per day as the majority of them obtained rather small, but steady additional flow. As was the case with the new wells, the majority of the drilling deeper operations obtained production from the Bradford group of sands; 52.3% of all the wells drilled deeper were carried to this horizon during the period.

11.1% of the drilling deeper operations were carried to sands above the 30' group. 23.3% were drilled to the Bayard group and 11.1% to the

Speechley group of sands. 2.2% were drilled below the Bradford Sand.

WELLS DRILLED DEEPER

Tabulation showing Gas Fields in Which Wells were Drilled Deeper for the First Time Dur- ing the Period 1915 to 1919					Fields in Which Wells Had Been Drilled Deeper Prior to 1915 and were Active from 1915 to 1919				
Year	Map*	Name of Field	L O C A T I O N		No.	No. Co.	Name of Fld.	No. Co.	
D.D. By Co.	Ref. No.		Township	County	1st. D.D. WELL D.D.	Wells in Field '19		Wells D.D. In Field Ref. 1915 to 1919	
1915	47	Webster	Rostraver	Westmld.	234	1	New Freeport	63	2
1915	5	Kiefer	Monroe	Clarion	877	2	Lantz	64	4
			Limestone				Woodruff	59	2
1915	44	Grapeville- Arona	Hempfield	Westmld.	994	1	Waynesburg	60	2
							Candor	49	6
1915	48	Florence	Hanover	Washington	639	1	Carnegie	33	2
1916	35	McKeesport	Versailles	Allegheny	1040	12	Latrobe	45	1
1916	12	New Salem	Red Bank	Armstrong	741	3	Murrysville	42	2
1917	36	McMurry	Peters	Washington	1209	3	Plum Twp.	29	11
			Snowden & Bethel	Allegheny			Pine Run	40	2
							Roaring Run	24	3
1918	50	Burgettstown	Smith	Washington	1447	1	Girty	23	5
1919	1	Clarion	Clarion	Clarion	1038	1	Plum Creek	22	3
			Monroe				Say	20	2
						25	Cowanshannock	16	1
							Goheenville	14	8
							Greenville	6	1
							Frogtown	3	2
							Imperial	27	1
							McCrea	15	4
							Belle Vernon	56	1
									65

* - See Map page 25.

From the above data, it is evident that the following fields were most active from a drilling deeper standpoint during the period. The McKeesport Field, the Plum Township Field, the Goheenville Field, the Candor Field and the Girty Field.

The only important field in which drilling deeper operations were conducted by the Company for the first time between 1915 and 1919 was in the McKeesport Field where large volumes were found in the Speechley Sand in 1919 and this encouraged the drilling down of 12 wells.

Other fields in which drilling deeper activities were noticed for the first time were not of great importance as producing mediums during this period and later were abandoned.

There were a total of 25 drilling deeper operations accounted for by fields in which this activity appeared for the first time.

The Plum Township Field in Allegheny County was being actively exploited by drilling deeper operations prior to this period, but was still very active at this time and 11 wells were drilled deeper, most of them getting an additional supply of gas in the Speechley Stray and Bradford Sands, after having formerly been producing from the 5th Sand.

Eight wells were drilled deeper in the Cohensville Field. These wells, for the most part, obtained new production in the Tiona Sand.

The Candor Field was responsible for six drilling deeper operations during the period, this deeper production coming from the 5th Sand.

There were five wells drilled deeper in the Girty Field, most of which obtained their production in the Speechley and Bradford Sands.

The remaining drilling deeper operations were not important in any individual field, but in the aggregate represented a material addition to the production of The Peoples Natural Gas Company.

Including the most important fields covered above, there were a total of 65 drilling deeper operations in fields which had been active in this particular respect, prior to 1915.

Production During the Period:

The yearly production from 1915 to 1919 was as follows:

1915	10,100,508 M
1916	13,152,893 M
1917	14,041,262 M
1918	13,850,362 M
1919	12,223,833 M
Total	63,368,858 M

The large production indicated above represents the greatest for any five year period of which there is a record. As has been stated above, this large production was due to the unusual demands made upon the Company by the war period.

An all time peak of production for the Company was reached in 1917, when 14,041,262 M cubic feet of gas was produced. However, it is noteworthy that this large production was only slightly higher than the production in 1905 when only 336 wells were owned, as compared to 1188 wells at the end of 1919.

In order to produce the 63,368,858 M cubic feet of gas it was necessary for the Company to have three times as many wells as they had during the period from 1905 to 1909 when a total of approximately 60 billion cubic feet of gas was produced. This indicates the large decrease in productivity per well which has been so marked in the Company's history since 1909. In order to maintain the large production which prevailed during this period, it was necessary to produce most of the Company's wells at capacity much of the time. The expansion in drilling operations required to maintain this production was so great that when markets were decreased as they inevitably were after the war period, some over-expansion was noticeable.

As has been stated above, the large production was maintained only by drilling a great many more wells than in the previous periods. In 1917, 198 wells were drilled. It was possible to find locations for so many wells during this period because of the comfortably large back-log of unoperated acreage which was carried by the Company during the period.

Reserve Added During the Period

The estimated reserve developed by the Company during the period 1915

to 1919 was 74,760.8 ML or approximately eleven billion more than was produced during the period. A glance at the Statistical Summary at the beginning of this chapter indicates that the greatest amount of this reserve was obtained from new wells drilled on previously unoperated leases. There was a total of 54,695.4 ML cubic feet of gas developed from this acreage. In addition to this reserve, 10,879.9 ML cubic feet of gas was developed from previously operated leases. 5,272.6 ML cubic feet of gas was acquired through the purchase of wells and 3,912.9 ML cubic feet was developed by drilling deeper operations.

The above data again emphasizes the importances of good quality unoperated acreage which was carried by the Company. It was the most important single factor in their ability to maintain sufficient gas to supply their markets during this strenuous period. The reserve developed during this period was the largest developed in any five year period in the Company's history. However, most of it was off-set by withdrawals during the period.

The average reserve developed per well was approximately 100 ML cubic feet. This represents an additional barometer of the tendency to obtain less gas per well as the years progressed, as it is estimated to have been about 140 ML cubic feet per well in the period ending in 1914.

DEPLETION AND ABANDONMENTS

Despite the fact that production was sorely needed during the period, there was an increase in the number of abandonments during this period. There was a total of 136 wells abandoned, as contrasted to 77 in the period ending in 1914. This trend of increase is, of course, to be expected, as the earlier wells were becoming exhausted in increasing numbers.

The fields in Armstrong County contributed most of the abandonments,

as this area had been under production for a long period and had been quite thoroughly explored in the deeper sands as far as the Bradford group. This area accounted for many of the abandonments, although some of the fields developed just prior to 1914 in Allegheny County proved to be short lived and there were a number of wells abandoned in that area. An appreciable number of the abandonments were also accounted for by conditions such as salt water encroachment and defective casing which were bound to show up in some of the older wells. A glance at the Map on page 23 will indicate to the reader those areas in which depletion is a noticeable factor in the areas operated by The Peoples Natural Gas Company. A total of 7926 acres were surrendered because of depletion.

Effect of Development on the Company's Acreage Holdings

An unusually large amount of unoperated acreage was turned over during the period because of the tremendous amount of development. This development proved or disproved large holdings of unoperated acreage in a much shorter time than would have been the case under conditions where development had proceeded at a normal pace.

At the beginning of 1915, the Company had 205,222 unoperated acres and at the end of the period, they had 302,543 unoperated acres. This represents a net change of roughly 100,000 more acres.

During the period, there were 34,256 unoperated acres which were proven productive by drilling operations. This is by far the largest amount of acreage developed during any one period and is more than half as much as the Company had at the beginning of the period.

69,422 unoperated acres were surrendered during the period, this large surrender being made possible by the information gained as to unproductive areas from the extensive drilling operations of the period. In order to

supplement this large change in acreage which withdrew approximately 100,000 acres from the Company's surplus of undeveloped territory, there were 198,790 acres leased.

These figures illustrate the large turn over in acreage which resulted from the intense and widespread drilling development of the period. The large acreage acquired was obtained in an effort to offset the depletion which took place because of the enormous production of the period. It was also possible to quickly determine what acreage held the best possibilities, because of the information on areas which was made available much more rapidly than formerly by the extensive testing which was being constantly carried on during this period.

By the end of 1919 the Company was holding the largest amount of unoperated acreage of any time during its history. The great need for gas supplies in order to maintain the markets of this period made it essential to acquire all the desirable acreage that it was possible to obtain as quickly as it became available if any back-log of undeveloped territory were to be carried at all. The Company had 58,545 acres of operated leases at the beginning of the period. This was increased to 85,841 acres at the end of the period. This figure, 85,841 acres, is near the peak of operated acreage ever held by the Company during its history, either before or after this time. After this period, the wells abandoned nearly exceeded the number of new wells drilled or purchased. A trend in this direction had been noticeable even prior to this period, but it was temporarily stopped during the war period when the demand for natural gas made it essential to drill an unusual number of new wells.

The large increase in unoperated acreage acquired during this period has been justified in later years because of the high quality of the acreage

secured as a result of the information obtained from drilling during the period and much of this acreage has been proven productive when the Company found it necessary to develop some additions to their supply. The Company has drawn upon this acreage for the last 18 years and it has made it possible to preserve an adequate supply for the consumers to be available as the need for it arises.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY - 1920 - 1924

Statistical Summary of Operations 1920 to 1924, Inc.

Producing Wells:

(No. at Beg. of Per.	1188
(Active Wells) No. at End of Per.	1226
(Net Change in Per.	38
No. of Prod. Wells Drilled in Per.	229
No. of Wells Purchased in Per.	2
No. of Dry Holes Drilled	48
No. of Wells Abandoned or Sold	193

Acreage:

Unop. Acreage Beginning of Per.	302,542.98
Unop. Acreage End of Period	244,972.12
Net Change in Unop. Acreage	-57,570.86*
No. Ac. Going into Opr. from Unop.	18,720.00
Operated Acreage at Beg. of Per.	85,841.15
Opr. Acreage at End of Period	99,372.93
Net Change in Operated Acreage	13,531.78*
No. Acres Surr. During Period	

Data on New Wells:

No. of New Wells Drilled	277
Total Footage Drilled	779,023'
Average Depth of Wells	2,822'

Operated - - -	8,407.72
Unoperated - - -	94,274.75
No. Acres Acquired During Per.	
Operated - - -	3,115.50
Unoperated - - -	50,198.51

Drilling Deeper:

No. of Wells Drilled Deeper	137
Total Footage from Drlg. Dpr.	115,332'
Avg. Addtl. Footage Per Well	842'

Reserve and Production Data:

Res. from New Wells, Unop. Leases	22,188.90M1
Res. from New Wells, Opr. Leases	3,760.70M1
Res. from Purchased Wells	217.50M1
Res. from Drilling Deeper	7,377.70M1
Total Additional Reserve	33,544.80M1

Source of Production:

New Wells	Sands Drilled	Drlg. Deeper		
No. % Tot.	To	No. % Tot.		
77 27.8	30' & Above	19 13.9		
113 40.8	Bayard Group	24 17.5		
33 11.9	Speechley Grp.	9 6.6		
44 15.9	Bradford Grp.	73 53.2		
10 3.6	Below " "	12 8.8		

Production for Period: - - - - 47,768.673M

* - Net Change indicated does not balance exactly with detail of Acreage Turn-over due to inadequate records

Difference	(Unoperated	45,225.38
	(Operated	4194.00

Introduction:

The outstanding characteristic of development during the years 1920 to 1924 was one of settled conditions. There were very few new fields found during this period, there being only one which was actually discovered during the period, although the Company drilled wells for the first time in two fields which had been discovered by other operators in prior years. The number of new producing

wells drilled and acquired during this period almost balanced the number of old wells which had to be abandoned.

There was a normal increase in drilling deeper again noticeable in this period. This reflected the lack of drilling deeper in the preceding period. It also indicated that the upper sands in a great many of the older wells had become depleted and were no longer commercially productive, thus necessitating the drilling deeper of these wells or abandonment. There was a tendency to increase the footage per well drilled deeper during this period, and this same trend was noticeable for the depth of new wells drilled.

Greene and Washington Counties were the most active from the standpoint of new wells drilled, and this is reflected in the statistics by the large increase of the number of wells drilled to the Bayard sand.

There was a noticeable decrease in the number of wells being drilled to the Bradford sand, although wells drilled deeper to this horizon increased considerably. An important occurrence for the future took place during this period when a small field was found producing from the Onondaga Limestone near McCance in the Eastern part of Westmoreland County. While this production was not very important from the standpoint of quantity, it indicated that gas could be found at a great depth in Pennsylvania. The wells drilled by the Company in this area held the record for being the deepest producing wells in the world at the time they were developed.

The period was also characterized by a big drop in production. This resulted from the let-down in industrial conditions after the war period. There was also a noticeable decrease in the productivity per well of active wells. This decrease in productivity per well necessarily resulted in an increase in the expense of obtaining gas, and consequently, some of the less

profitable markets were discontinued during the period. For the first time in the Company's history, it had fewer unoperated acres at the end of the period, than at the beginning of the period. This class of acreage was actually decreased by 57,571 acres. This drop in unoperated acreage reflects the fact that most of the prospective acreage available had been taken up and the sifting process by which acreage was acquired and surrendered was now resulting in a decrease in acreage because much of the territory available for leasing had been condemned and less territory was being proven. It was also more difficult to find good unoperated acreage, as many of the prospective areas which remained for development were prospective chiefly because of the prospect in the deeper sands, and since operations were still active in the upper sands, the acreage was not available for acquisition.

Despite the fact that a big drop occurred in production, there was less reserve developed than the amount of gas withdrawn by production. This condition reflected the difficulty of finding new flush fields as a source of production.

Geographic Distribution of New Areas Under Development During the Period 1920-1924

A reference to the Map on Page 23, which shows the developments in this period, will indicate that as in the past two periods, the extensions in producing areas were confined to the same general area as had been outlined as early as 1909. The only exception to this was the McCance field in Eastern Westmoreland County. The most significant additions to productive territory were confined to Eastern Washington County and Central Greene County. A small area in Eastern Indiana County was added and a somewhat larger territory was developed in Porter Township, Clarion County.

Practically all of the important additions to productive regions resulted

from extensions to previously described fields, especially in Washington and Greene Counties. Part of these extensions were due to the discovery of new supplies of gas in deep sands of the over-lapping old pools, which often extended the areas in one direction or the other.

New Fields Open or Participated in by the Company:

There were only three fields in which the Company operated for the first time during this period. Only one of these fields was actually discovered during the period. The tabulation below lists these areas in chronological order.

New Fields Becoming Available to The Peoples Nat. Gas Company from 1920 to 1924:

Year					No.	Dis-	New Co.
1st.	Map#	Name	L o c a t i o n		Cos.	cov-	Wells In
Opr.	Ref.	of			1st	ery	Field Dur-
ByCo.	No.	Field	Township	County	Well	Date	ing Period
1920	46	McCance	Ligonier	Westmoreland	1588	1920	1
1921	8	Cherry Run	Toby & Porter	Clarion	1818	1865*	10
1923	57	Zollarsville	West Bethlehem	Washington	1914	1902*	2
			Morgan	Greene			
			Washington	Greene		Total	13

- See Map - Page 25

* - Second Geological Survey, Bulletin M-19

The most significant fact concerning these fields is the great decrease in the number of fields, and also the number of wells. The three new fields made available to the Company during this period contributed a total of thirteen new wells. The most active of these fields was the Cherry Run field in Porter Township, Clarion County, in which ten new wells were drilled.

The McCance field in Ligonier Township, Westmoreland County was the only one of these fields discovered during the period. This field is important, not because of the number of wells drilled, but because it represents the first test of the Onondaga Limestone and Oriskany sand in the area. A well was started on January 12, 1919 and completed March 3, 1920 at a total depth of 6,822 feet. It required about a year and three months to complete the well. Production was found in the Onondaga Limestone at a depth of 6,822 feet, and the open flow was 300,000 cubic feet. There was also some salt water with the gas. The well was produced for about ten years before it became necessary to abandon it on account of increasing amounts of salt water. The well at the time it was completed was the deepest producing well in the world. Another well was completed on December 20, 1924, but this well had only a show of gas and was abandoned at a total depth of 6,989 feet. A third well was completed in 1925, which had an open flow of 297,500 cubic feet. This well was short lived, and it was drilled to 7,755 feet, and abandoned after finding some sulphur gas in the Silurian at a depth of 7,428 feet.

This field derives its importance from the fact that it proved that gas was available at depths previously untested in the Eastern fields, and as drilling technique improved, the occurrence of this gas encouraged operators to seek other fields in Southwestern Pennsylvania in these deeper Horizons. Exploration for this deep gas is now very important, and will be exceedingly important in the future.

The third field which became available to the Company was the Zollarsville field in Morgan and Washington Townships, Greene County and West Bethlehem Township, Washington County. This field contributed two new wells during the period.

Old Fields Extended by Operations - 1920 to 1924:

The following table shows the number of old fields which were extended during the period, together with the number of new wells drilled in the field:

OLD FIELDS EXTENDED

Name of Field	Map# Ref. No.	No. of New Co. Wells Drld. in Field 1920-1924	Name of Field	Map# Ref. No.	No. of New Co. Wells Drld. in Field 1920-1924
New Freeport	63	22	Latrobe	45	1
Lantz	64	17	Delmont	43	1
Woodruff	59	5	Plum Township	29	10
Gump	62	17	Murrysville	42	4
Waynesburg	60	30	Pine Run	40	1
Belle Vernon	56	25	Plum Creek	22	7
Somerset	55	27	McNees	17	2
McMurry	36	1	New Bethlehem	10	1
Burgettstown	50	4	Buttenbender	9	1
Candor	49	3	Kiefer	5	1
Webster	47	6	Shamburg	4	3
Lincoln	37	2	Frogtown	3	8
McKeesport	35	1	Greenville	6	5
Grapeville-Aron	44	13			

Total 218

- See Map, Page 25

The Company extended its operations during the period in twenty-seven fields which had been active prior to 1920. The operations in the greater number of these fields were of minor importance.

The outstanding fields from the standpoint of new developments were the Waynesburg, New Freeport, Lantz and Gump fields in Greene County; the Somerset and Belle Vernon fields in Washington County; the Grapeville-Arona field in Westmoreland County and the Plum Township field in Allegheny County.

The Waynesburg field was the most active of the group, making available to the Company thirty new wells. This development resulted in a major ex-

tension of the field to the southeast and a minor extension to the north. The extensions were due chiefly to production being encountered in the Big Injun and Bayard Stray group of sands.

The New Freeport field contributed twenty-two new wells, the majority of which were drilled within the previously developed area. The Big Injun and Bayard Stray group of sands were chiefly responsible for the new production.

The Gump and Lantz fields contributed seventeen new wells each to the Company. The development in these fields consisted of operations within the previously productive portions of the fields and major extensions of the fields to the east and southeast. The majority of the production was encountered in the First Gas, Big Injun and Bayard Stray group of sands.

The Somerset and Belle Vernon fields contributed twenty-seven and twenty-five new wells respectively. The activity in these two fields was chiefly confined to extension of previously productive areas. The production was derived chiefly from the Big Injun and Elizabeth group of sands.

The Grapeville-Arona and Plum Township fields contributed thirteen and ten wells respectively. These wells resulted from development within and immediately surrounding the previously productive areas. The production was derived principally from the Hundred Foot, Speechley Stray and Bradford sands in the Grapeville-Arona area, and from the Fifth, Speechley Stray, Speechley and Bradford group of sands in the Plum Township area.

The remaining fields were unimportant individually, but the aggregate production constituted an important addition to the Company's gas supply.

Trend of Drilling During Period 1920 to 1924:

The number of active wells owned by the Company reached an all time high at the end of this period. However, it showed the smallest increase from the beginning of the period to the end of the period of any time in the Company's history, indicating the leveling off in the number of active wells which was taking place. This was borne out by the fact that from this time forth, abandonments exceeded new wells, thus decreasing the number of active wells.

There were eleven hundred eighty-eight active wells at the beginning of the period. This was increased to twelve hundred twenty-six at the end. This was accomplished by the drilling of two hundred twenty-nine producing wells and the purchase of two wells (smallest number in the Company's history). These were off-set by the abandonment or sale of one hundred ninety-three wells, the greatest number of any period discussed so far. The Company drilled a total of two hundred seventy-seven wells, of which forty-eight were dry holes. This indicated a slight decrease in the percentage of dry holes drilled.

The average depth of wells drilled was twenty-eight hundred twenty-two feet, showing a continued trend toward deeper wells, as it was twenty-seven hundred fifty-six feet in the preceding period.

The percentage of wells drilled to the shallower group of producing sands went up during this period, after an almost continuous tendency downward in preceding years.

Twenty-seven and eight tenths percent of the wells drilled found production in the Thirty-Foot or above in this period. This reversal of trend was due to the development of considerable gas in the Big Injun sand

resulting from extensions to the New Freeport and Lantz fields in Greene County, as well as a relatively large number of successful completions in the Hundred Foot sand in the Somerset field in Washington County.

There was a large increase in the percentage of wells going to the Bayard group of sands. This reflected the increased activity in central Greene County where this sand group is of considerable importance as a source of gas.

Forty and eight tenths percent of all wells drilled found production in the Bayard group of sands, as contrasted to seventeen and eight tenths percent in the preceding period discussed in this report.

Eleven and nine tenths percent of the wells drilled were carried to the Speechley group of sands during the years 1920 to 1924. This represents a decrease of about three percent over the preceding period.

The percentage of completions to the Bradford group of sands during the years 1920 to 1924 shows a drastic drop over the preceding period. These completions dropped to fifteen and nine tenths percent as compared to forty-nine and four tenths percent in the period ending in 1919. This was largely due to the complete development and actual beginning of abandonments of wells which went to this horizon in Clarion and Armstrong Counties where it is of utmost importance.

Practically all of the new developments in the Bradford group of sands were accomplished by the drilling deeper of old wells during this period and the statistics on drilling deeper operations show a big increase in wells drilled to the Bradford group of sands.

An outstanding trend of this period which will be very important to the future of the Company was the increase in the number of wells drilled below

the Bradford, which climbed to three and six tenths per cent during this period, the largest in the Company's history.

Production was developed in the Onondaga for the first time anywhere in the United States by two wells drilled in the McCance field. There were three wells drilled in this small but important pool, the average depth of which was 7,189 feet. One of these wells obtained an open flow of 300,000 cubic feet, and another an open flow of 297,500 cubic feet. Some of the gas obtained in the very deep wells contained hydrogen sulphide, and it was necessary to treat it for the removal of this undesirable element. At the time the wells were drilled, it was thought that the production was coming from the Oriskany sand, and this opinion prevailed for many years. In fact, it was not until developments were carried on in 1937 and 1938, which were encouraged by this early deep pool, that it was realized that this production was actually in the Onondaga Limestone. The wells drilled in this area were very expensive, ranging in price from \$50,000.00 to \$102,000.00. Development of this horizon was so expensive that it did not appear to be economically sound during those early years, but the discovery of this gas was of great importance, and as drilling technique improved, operators were again encouraged to seek supplies of gas in the deep horizons, and this tendency is very noticeable at the present as there are now many operations being carried on in the hope of finding new supplies of gas in these formerly untested horizons.

The statistics of the period on the percentage of wells drilled to various depths were as follows:

Wells Drilled to a Depth of 0 to 1500' -	6.3%
Wells Drilled to a Depth of 1501 to 2000' -	9.5%
Wells Drilled to a Depth of 2001 to 2500' -	14.7%
Wells Drilled to a Depth of 2501 to 3000' -	24.2%
Wells Drilled to a Depth of 3001 to 3500' -	30.6%
Wells Drilled to a Depth of 3501 to 4000' -	11.5%
Wells Drilled to a Depth below 4000' -	3.2%

Drilling deeper operations increased in this period over that in the five years ending in 1919. The tabulation showing the fields in which these operations took place will be found below:

WELLS DRILLED DEEPER

Tabulation Showing Gas Fields in Which Wells were Drilled Deeper for the First Time During the Period 1920 to 1924

Fields in Which Wells had Been D.D. prior to 1920 and were Active - 1920 - 1924

Year	D.D.	Map#	Name of	Location		No.	No.	Fields in Which Wells	
By	Ref.	Co.	Field	Township	County	Well	Field	Map#	D.D. in
Co.	No.					D.D.	End '24	Ref.	1920-24
1920	55	Somerset	Fallowfield	Washington	1518	2	New Freeport	63	7
			Somerset	Washington			Lantz	64	7
			Nottingham	Washington			Woodruff	59	2
			Peters	Washington			Gump	62	2
1920	4	Shamburg	Monroe	Clarion	1392	12	Waynesburg	60	6
			Limestone	Clarion			Belle Vernon	56	4
1921	37	Lincoln	Lincoln	Allegheny	1705	1	Webster	47	6
1921	10	New Bethle-	Red Bank	Clarion	1569	2	McMurry	36	2
		hem	Porter	Clarion			McKeesport	35	2
1923	7	Shannondale	Limestone	Clarion	868	1	Grapeville-	44	7
			Red Bank	Clarion			Arona		
							Pine Run	40	5
							Latrobe	45	2
							Delmont	43	2
							Murrysville	42	1
							Plum Twp.	29	5
							Roaring Run	24	2
							Girty	23	4
							Shellhammer	21	2
							Plum Creek	22	11
							Say	20	2
							McNees	17	3
							Goheenville	14	10
							McCrea	15	1
							Kiefer	5	6
							Frogstown	3	12
							Greenville	6	4
							Cowanshannock	16	1
							Candor	49	1
							Total		119

The above table shows that the following fields were most active from a drilling deeper standpoint during the period: Shamburg, Frogtown, Plum Creek, Coheenville, Grapeville-Arona, New Freeport and Lantz.

The only field in which extensive drilling deeper operations were conducted for the first time by the Company during the period 1920 to 1924, was the Shamburg Field. This drilling deeper activity was primarily due to the discovery of gas in the Tiona and Sheffield group of sands. This production resulted in the drilling down of twelve wells.

Four other fields were drilled deeper for the first time during this period, but the number of wells drilled down was not sufficient to be of great importance during this time interval.

There was a total of eighteen drilling deeper operations in fields where this activity was noticed for the first time between 1920 and 1924.

The Frogtown Field had experienced some drilling deeper activity prior to this period. This activity resulted in the drilling deeper of twelve wells between 1920 and 1924. The majority of these wells encountered additional production in the Balltown sand.

Eleven wells were drilled deeper in the Plum Creek Field. These wells for the most part obtained production in the Tiona and Second Bradford Sands.

The Coheenville Field accounted for ten drilling deeper operations in this period, an increase of two over the preceding period. The new production was obtained from the Tiona, Balltown, Sheffield and Kane sands.

The Lantz and New Freeport Fields accounted for seven drilling deeper operations each. Incentive for these operations resulted from production being encountered in the Big Injun and Bayard Stray group of sands.

In the Grapeville-Arona Field, a total of seven wells were drilled deeper during the period 1920 to 1924. Most of these wells encountered production in the Speechley Stray and Third Bradford sands.

The remaining fields were active individually only to a slight extent, but their combined production represented a material addition to the Company's gas supply.

There was a total of one hundred nineteen drilling deeper operations in fields in which wells had been drilled deeper prior to 1920 and were active during the period 1920 to 1924.

Production During the Period:

The production for the period by years is as follows:

1920 - 12,293,239M	1923 - 9,984,853M
1921 - 8,347,043M	1924 - 7,230,277M
1922 - 9,913,261M	

TOTAL - 47,768,673M

From the above figures, it is evident that there was a decrease of 15,600,185M cubic feet in the production during this period, as compared to the previous five year period which has been discussed. The previous five year period was the war period, and it was to be expected that there would be a considerable drop in production, as the abnormal business conditions attending the war period became settled. However, this is not the only reason for the drop in production. Part of the drop was due to the fact that it was not possible to maintain the high rate of withdrawals which had been prevalent during the previous period. This is made evident by the fact that even though the production was greatly decreased, it was necessary to drill a considerable number of new wells in order to

maintain the markets. It is well to note that the production for this period was only slightly in excess of that for the period ending in 1914. In the latter period, it was possible to maintain the production with 742 wells as of the end of the period, whereas, in the period ending in 1924, there were 1,226 wells from which to obtain the production. This indicates a decrease in productivity per well of about 40% from the period ending 10 years before.

Reserve Added During the Period:

The increasing difficulty of developing new supplies of gas is reflected in the amount of new reserve developed by the drilling and purchase of wells during this period.

For the first time in the history of the Company, the reserve developed was less than the amount of gas withdrawn by production. The estimated total reserve developed during the period was 33,544.8ML Cubic Feet and as in previous periods, most of it was obtained from wells drilled on unoperated leases. The total obtained from this source was 22,188.9ML Cubic Feet. Of the remaining reserve developed, 3,760.7ML Cubic Feet resulted from new wells drilled on operated leases; 217.5ML Cubic Feet from purchased wells, and 7,377.7ML Cubic Feet was obtained from drilling old wells deeper.

The reserve developed from drilling deeper operations was the most satisfactory for the number of operations involved, and it also showed less tendency downward from the preceding periods. This indicates the vital importance in later years of the deep sands in maintaining gas supplies.

The estimated reserve developed per well drilled for this period was about ninety-four Million cubic feet, and from drilling deeper operations, it was about fifty-four million cubic feet per well drilled deeper.

Depletion and Abandonments:

As mentioned above, the abandonments were taking place at a constantly accelerated pace during each succeeding year. This condition is to be expected, as all of the wells were becoming older. In this period, the depletion trend is even more noticeable. There were one hundred ninety-three wells abandoned or sold, and this number very nearly equaled the number of producing wells drilled or purchased, for the first time in the history of the Company. A total of eighty-four hundred eight acres were surrendered because of depletion, as a result of the above abandonments. This is still considerably less acreage than the amount going into operated for the period, but the trend indicates how essential a back-log of good unoperated acreage was from this period forth, as a supplement to the increasing amount of acreage which was being depleted. A glance at the Map on Page 23, indicates that depletion was taking place throughout the Company's territory, with the exception of Greene County. Rather extensive areas were abandoned for the first time in Clarion County, especially in the Frogtown Field which had reached its full development in the period ending in 1919. The depletion started in this area during this period has continued down to the present. There was also a considerable amount of depletion in the Northwestern part of Westmoreland County and in Allegheny County.

From the above, it is evident that much of the depletion was taking place in the Northern Counties. This was natural, as the Upper Devonian

sands, down to and including the Bradford, had been quite completely developed by 1924, since the depth to these sands is not so great in this area.

Since the territory had been so thoroughly developed, it was necessary to abandon wells when they became depleted, whereas, in former periods it had been possible to rejuvenate them by drilling to a deeper sand.

Effect of Developments on the Company's acreage Holdings:

The Company had 302,543 acres of unoperated leases at the beginning of 1920. Of this quantity, 18,720 acres were transferred to operated as a result of drilling operations, and 94,275 acres were surrendered, as the Company's and other outside operations, indicated they were not prospective. In addition to these changes, 50,199 acres were acquired. The net effect of these changes was a decrease of 57,571 acres for the period, or a total of 244,972 acres as of the end of 1924. This was the first time in the Company's history when it had a decrease in the amount of unoperated acreage held. It is significant that this lack of desirable unoperated acreage available for leasing should coincide with a time when practically all of the shallow sands (down to the Bradford and Bayard) had been thoroughly explored, and favorable areas were quite well known.

It may be seen that the sifting process had become one of elimination of unfavorable acreage, rather than acquisition, and this tendency is noticeable in the Company's leasing activities until 1930 when the possibilities of the deep Criskany and Onondaga horizons made it desirable to acquire acreage in areas formerly thought to be unprospective.

The Company had 85,841 acres of operated leases in 1920 and by 1924, this was increased to 99,373 acres, the highest total during any of the periods discussed in this report. The increase in operated leases resulted from a transfer of 15,604 acres from unoperated to operated on account of drilling operations, and an additional 3,116 acres acquired through purchase of the holdings of the Rock Run Fuel Company in the latter part of 1919, together with several other well purchases.

HISTORICAL DEVELOPMENT OF THE PEOPLES NATURAL GAS COMPANY - 1925 - 1936

Statistical Summary of Operations 1925 to 1936 Inclusive

Producing Wells:

(No. at Beg. of Period	1,226
(Active Wells) No. at End of Period	1,081
Net Change in Period	145
No. of Prod. Wells Drilled in Per.	182
No. of Wells Purchased in Period	15
No. of Dry Holes Drilled	53
No. of Wells Abandoned or Sold	342

Data on New Wells:

No. of New Wells Drilled	235
Total Footage Drilled	661,235'
Average Depth of Wells	2,814'

Drilling Deeper:

No. of Wells Drilled Deeper	299
Total Footage from Drlg. Deeper	173,309
Avg. Addtl. Footage per Well	579'

Source of Production:

<u>New Wells</u>		<u>Sands Drilled</u>		<u>Drlg. Deeper</u>	
No.	% Tot.	To		No.	% Tot.
59	25.1	30' & Above		27	9.1
116	49.4	Bayard Group		97	32.4
16	6.8	Speechley Grp.		30	10.0
25	10.6	Bradford Grp.		103	34.4
19	8.1	Below " "		42	14.1

Acreage:

Unop. Acreage Beginning of Per.	244,972.12
Unop. Acreage End of Period	297,935.16
Net Change in Unop. Acreage	52,963.04*
No. Ac. Going Into Opr. from Unop.	11,453.55
Operated Acrg. at Beg. of Per.	99,372.93
Opr. Acreage at End of Period	92,834.68
Net Change in Operated Acreage	-6,538.25*
No. Acres Surr. During Period	
Operated - (Estimated)	17,710.04
Unoperated - (Estimated)	150,739.82
No. Acres Acquired Dur. Period	
Operated - (Estimated)	668.90
Unoperated - (Estimated)	220,915.00

Reserve and Production Data:

Res. from New Wells, Unop. Leases	11,314.50M1
Res. from New Wells, Opr. Leases	2,660.80M1
Res. from Purchase Wells	1,372.50M1
Res. from Drilling Deeper	7,014.00M1
Total Additional Reserve	22,361.80M1

Production for Period: 61,091,643M

* - Net change indicated does not balance exactly with detail of acreage turn-over due to inadequate records.

Difference (Unoperated - -5,758.59
(Operated - -949.76

Introduction:

The last period to be discussed in this report is for twelve years instead of the five year interval which has been used in previous parts of this report. It was deemed advisable to discuss this as a twelve year period instead of a five year period, because there was practically no active development after 1931. Because of the severe drop in markets during the depression period, it was found un-

necessary to drill any additional wells. It was also necessary to curtail expenses in every part of the Company's business, since income was insufficient to justify any expenditures, except those which were absolutely essential for maintenance of the Company's property. Practically all of the energies of the Company were devoted to activities which would reduce expenses, and it was impossible to give any thought to the development of new reserves under the conditions which resulted from the long depression in business.

During the period 1925 to 1936, and particularly after 1930, there were a number of new gas fields found in the deep Oriskany sands in Northern Pennsylvania, Southern New York and near Charleston, West Virginia. These discoveries stimulated an interest in this deep horizon for operators in Southwestern Pennsylvania. Consequently a number of exploratory tests were made to these deep horizons in this portion of the State, and two gas pools were opened. One small pool producing from the Oriskany is located in South Beaver Township, Beaver County, and was discovered on December 24, 1935. Another pool, the limits of which are still indefinite, was opened April 23, 1937, and is located south of Uniontown, Pennsylvania. This latter pool is producing from the Onondaga Limestone. Exploration in these deep sands had not gone far enough in 1936, and indeed not at the present time to determine how important they may ultimately become as a source of natural gas in the area in which The Peoples Natural Gas Company operates. See Map Page 12.

Production for the period 1925 to 1936 was at a new low for all time, it having been but 61,091,643 Ml. cubic feet for the entire twelve year

period, as contrasted to 47,768,673 Ml. cubic feet for the five year period ending in 1924. The yearly production, even during the years up to 1929, when industrial conditions were comparatively good was lower on a per year basis than at any time in the previous history of the Company. In 1932, the yearly production dropped to 2,783,626 Ml. cubic feet. This is the lowest, and in fact, it is less than half as much as they produced in any year prior to this time.

These figures indicate to the reader how drastic the drop in production was during this period. It did, however, pick up after 1932 and by 1936 had reached 6,045,209 Ml. cubic feet per year.

The inevitable result of not drilling new wells for this long period from 1932 to 1936 resulted in a drop in the amount of operated acreage held by the Company. This is the first time that this trend has been definitely downward, although in the prior period, we have seen that the increase in operated acreage was leveling off. There was actually a net decrease of 6,538 acres between 1925 and 1936. This resulted from depletion and abandonment of wells which were not replaced by new acreage being operated.

Geographic Distribution of New Areas Under Development During the Period 1925-1936

The only additions to productive areas resulting from wells drilled by The Peoples Natural Gas Company were in Green and Washington Counties. In these two Counties, some of the older fields were extended, and a new field was operated for the first time in both Counties. There were also some small additions to operated territory in Bell Township, Westmoreland

County and Porter Township, Clarion County. A glance at the Map on Page 23 will indicate the areas developed by the Company during this period.

As a result of drilling by other companies, a new field was developed in Washington County in Amwell Township. This was a long narrow field extending through Amwell and into South Strabane Township, and produced both oil and gas.

The above described deep drilling to the Oriskany and Onondaga resulted in the discovery of a small pool in Beaver County and one in Fayette County. The location of wells being drilled to the Onondaga and Oriskany are shown on the Map on Page 12, and this map also shows the location of the two pools which were discovered during this period.

New Fields Opened or Participated in by the Company:

During the last twelve year period, 1925 to 1936, there were only four fields in which the Company operated for the first time. These fields were discovered prior to this time, and were being exploited by other operators.

In chronological order of availability to the Company, these new areas are as follows:

New Fields Becoming Available to The Peoples Nat. Gas Company from 1925 to 1936

Year	Map#	Name	Location		No.	Dis-	New Co.
lst.	Ref.	of			Cos.	cov-	Wells in
Opr.		Field	Township	County	lst	ery	Field Dur-
ByCo.	No.				Well	Date	ing Period
1926	61	Garrison	Whiteley	Greene	2961	1876*	7
			Dunkard	Greene			
			Greene	Greene			
1927	53	Buffalo	Hopewell	Washington	2136	1887*	2
			Mt. Pleasant	Washington			
1930	25	Apollo	Kiski	Armstrong	3568	1900*	1
1932	30	Nine Mile Run	City of Pittsburgh	Allegheny	3569	1920†	1
							11

- See Map, Page 25

* - 2nd Geological Survey, Oil & Gas Fields of Penna. Bulletin M-19

† - Topo. & Geologic Atlas of Penna. #27, Pittsburgh Quad.

These four fields made available to the Company a total of eleven new wells. This indicates a still further decline in the number of new wells resulting from the discovery of new fields.

The Garrison Field contributed seven new wells to the Company's holdings in this period, and was the most active of the new fields.

The Anwell Field mentioned above was discovered and operated by other Companies during this period. However, The Peoples Natural Gas Company did not have production in this field until 1937 when one successful well was drilled in the area.

Old Fields Extended by Operations - 1925 to 1936:

The following table shows the number of old fields which were extended during the period, together with the number of new wells drilled in the field:

OLD FIELDS EXTENDED

Name of Field	Map# Ref. No.	No. of New Co. Wells in Field 1925-1936	Name of Field	Map# Ref. No.	No. of New Co. Wells in Field 1925-1936
New Freeport	63	17	Girty	23	1
Lantz	64	10	Ford City	18	4
Bristoria	58	1	McNees	17	1
Woodruff	59	4	Goheenville	14	1
Gump	62	25	McCrea	15	1
Waynesburg	60	13	Mahoning Furnace	13	1
Zollarsville	57	13	Little Mud Lick	11	2
Belle Vernon	56	33	New Bethlehem	10	9
Somerset	55	7	Buttenbender	9	2
Webster	47	2	Cherry Run	8	14
Latrobe	45	1	Kiefer	5	3
McCance	46	1	Shamburg	4	1
Plum Township	29	3	Manor	2	6
Bell Township	41	4	Clarion	1	1
Pine Run	40	2	Frogstown	3	1
Roaring Run	24	1	McMurry	36	1

Total 186

- See Map, Page 25

The Company extended its operations in the period 1925 to 1936 in thirty-two fields which had been operated prior to 1925. Operations in the fields contributed a total of one hundred eighty-six new wells to the Company. This represents a decrease of fourteen and seven tenths per cent from that of the previous period ending in 1924.

The most active of the fields were the Belle Vernon, Gump, New Freeport, Cherry Run, Waynesburg, Zollarsville and Lantz.

The Belle Vernon field was the most active of the group, adding thirty-three new wells to those already operated by the Company. The majority of these wells were drilled in extending the field to the Southwest into Deemston Borough. The Big Injun, Gantz and Bayard group of sands were responsible for most of the production.

The Gump Field was responsible for twenty-five new wells, most of which were drilled within or very near the area which had been developed in previous periods. The Big Injun and Bayard sands accounted for the largest portion of the production.

The New Freeport and Lantz Fields contributed seventeen and ten new wells respectively, to the wells being operated by the Company prior to this period. These wells were practically all located within or near the outlines of the field as had been fixed by operations during the preceding years. Production from the Big Injun and Bayard Stray group of sands was responsible for the development.

The Cherry Run Field contributed a total of fourteen new wells to the Company's holdings. Except for a minor extension to the Northwest in the Murrys ville sand, the development largely took place in and around previously proven areas. Most of the production was obtained from the

Speechley and Bradford group of sands.

There were 13 new wells drilled by the Company in the Waynesburg Field during the period 1925 to 1936. The majority of these wells were located in an area Northeast of the general area which had been producing in previous years. The presence of gas in the Big Injun to Bayard Group of sands accounted for the extension of the field.

The Zollarsville Field accounted for 13 new wells to be added to those already being operated by the Company. These wells represented a decided extension of the field to the West, gas being found in the Bayard and Bayard Stray group of sands.

The remaining fields contributed few wells individually, but their aggregate production represented a material addition to the Company's gas supply.

Trend of Drilling During Period 1925 to 1936:

Practically all of the drilling during this period took place prior to 1932, and only 6 wells were drilled in 1931. The complete shut down in drilling activities was occasioned by depressed business conditions, and the consequent drop in markets which accompanied the depression.

Until 1931, drilling activities had progressed at a normal rate; hence the total number of wells drilled during the 12 year period was 235, which was less than had been drilled in the 5 year period preceding 1925. Of the 235 wells drilled, 53 were dry holes and 182 were producing wells. The company purchased 15 wells making a total of 197 new wells added to the active wells owned by the Company.

The trend toward an increased number of abandonments which had been

steadily growing in the last periods discussed, reached the place where it exceeded the number of new wells added to the Company's holdings. There were 342 wells abandoned, thus the Company had 145 less wells at the end of 1936 than they had in 1925, or a total of 1081 active wells as compared to 1226 at the beginning of the period.

The average depth of wells drilled during this period was 2814 feet as contrasted to 2822 in the period before. This fact indicates that wells in the Western Pennsylvania area, producing from the Upper Devonian sands will average about 2800 feet in depth when all of the sands down to, and including, the Bradford are being actively exploited. It also indicates that the so called deeper sands, Bayard and Bradford had passed the exploratory stage, and were now being developed in routine fashion at about the same rate from year to year. Thus, it is apparent that new sources of gas from this time forth must be explored for in the deeper Oriskany and Onondaga Horizons.

The Peoples Natural Gas Company had not started drilling wells to this deeper horizon by the end of 1936, but had started acquiring acreage with possibilities for deep prospecting as early as 1930.

An important development from the standpoint of the Company's future was the increase of interest in the possibilities of obtaining new reserves of gas in the deep Onondaga and Oriskany horizons.

Beginning in 1930, and continuing right up to the end of 1936, a number of new gas fields producing from the Oriskany sand were found in Northern Pennsylvania and Southern New York. Simultaneous with this development, a large field was opened and developed in the Oriskany sand near Charleston,

West Virginia. Since production was being found from this deep horizon in these two areas lying almost four hundred miles apart, and with the shallow gas fields in which The Peoples Natural Gas Company operated in Southwestern Pennsylvania being between the two areas, it was logical to believe that Southwestern Pennsylvania would also have possibilities for gas supplies in these deep horizons. Consequently a number of outside operators began exploring for Oriskany sand gas in Southwestern Pennsylvania. For the most part, these explorations were carried on in the extreme Western part of the State where the depth to the Oriskany was not so great. These explorations resulted in a small field located in South Beaver Township, Beaver County, which was discovered with the drilling in of the Calvin #1 Well on December 24, 1935, by John T. Galey, et al. In August, 1936, gas was discovered in the Onondaga Limestone in a well South of Uniontown. This well was located on the Leo Heyn property. When the well was finally completed on April 23, 1937, it had an open flow of two million cubic feet. Both this pool and the small pool in the Oriskany have been further developed since 1936, but are still insufficiently drilled to know whether or not they will be an important source of gas.

(See Map showing location of Deep Wells, page 12
and Table accompanying same, Pages 13 and 14)

The sands being developed during this period were much the same as those in the preceding period, as will be noted from the data contained in the Statistical Summary preceding this portion of the report. Since the average depth of wells was practically the same for this period as in the period preceding, this similarity in source of gas was to be expected.

The only significant departure from the preceding period was the increase in the percentage of wells being drilled below the Bradford Group.

Eight and one tenth per cent of all wells drilled during this twelve year period were drilled below the Bradford, as contrasted to only three and six tenths in the period preceding. The same trend was noticeable in drilling deeper operations in which the wells going below the Bradford increased from eight and eight tenths percent to fourteen and one tenth percent.

The number of wells drilled deeper was greatly curtailed during this period for the same reasons that affected the new wells. The total number of wells drilled deeper during this twelve year period was not much in excess of the number of similar operations in the five year period ending in 1924. Most of the operations took place prior to 1931.

A tabulation showing the Fields in which Drilling Deeper operations were carried on by the Company follows:

WELLS DRILLED DEEPER

Tabulation Showing Gas Fields in Which
Wells were Drilled Deeper for the First
Time During the Period 1925 to 1936

Fields in Which Wells Had
Been D.D. Prior to 1925 &
Were Active -1925-1936

Year	Map D.D. ByCo.	Ref. Name of Field	L o c a t i o n		No. Cos. Well	No.Co. D.D.in Field	Name of Field	Map Ref.	No.Co. Wells DD in Field
			Township	County	D.D.	End 36		No.	1936
1926	19	Atwood	Washington	Indiana	1193	1	New Freeport	63	18
			Plum Creek	Armstrong			Lantz	64	23
1926	41	Bell Twp.	Bell	Westmoreld.	839	1	Bristoria	58	5
1927	48	Florence	Hanover	Washington	637	2	Gump	62	14
1928	34	Mifflin	Jefferson	Allegheny	1745	1	Waynesburg	60	13
			Mifflin	Allegheny			Belle Vernon	56	16
1929	38	Elizabeth	Jefferson	Allegheny	1736	1	Somerset	55	14
1930	2	Manor	Monroe	Clarion	1257	2	Webster	47	7
			Clarion	Clarion			Candor	49	6
1930	11	Little Mud	Red Bank	Armstrong	1254	1	McMurry	36	2
		Lick					Carnegie	33	4
1931	46	McCance	Ligonier	Westmoreld.	1588	1	McKeesport	35	5
1931	57	Zollars- ville	Washington	Greene	3532	1	Grapeville-	44	15
			Morgan	Greene			Arona		
1936	54	Finleyville	Peters	Washington	1174	1	Latrobe	45	4
							Plum Township	29	7
							Murrysville	42	7
							Pine Run	40	3
							Roaring Run	24	3
							Girty	23	4
							Shellhammer	21	1
							Plum Creek	22	9
							Say	20	2
							McNees	17	1
							Goheenville	14	10
							McCrea	15	3
							New Salem	12	5
							New Bethlehem	10	2
							Kiefer	5	18
							Shamburg	4	19
							Clarion	1	4
							Frogtown	3	24
							Greenville	6	18
							Woodruff	59	1
							Total		287

There were ten fields in which drilling deeper operations took place for the first time during the period 1925 to 1936. This new activity in drilling deeper was of small importance in any individual field.

Twelve wells were drilled deeper in Fields which had not experienced any deeper drilling activity in previous years.

The most active Fields from a drilling deeper standpoint during this period were the Frogtown, Lantz, Shamburg, Greenville, New Freeport, Belle Vernon, Kiefer, Cump, Somerset, Grapeville-Arona, Coheenville and Plum Creek. These Fields had all experienced some drilling deeper activity prior to the period under discussion.

The Frogtown Field was the most active of the group mentioned above. Twenty-four wells were drilled deeper in this Field. This intensive activity resulted from the discovery of gas in the Tiona Sand.

Twenty-three wells were drilled deeper in the Lantz Field. The Majority of these wells were seeking additional production in the Bayard Stray sand which was found to be productive in the preceding period.

The Shamburg Field was also quite active from the standpoint of drilling deeper operations, there being a total of nineteen wells carried through to the deeper producing horizons. Most of these wells encountered additional production in the Balltown and Sheffield Group of sands.

The Greenville Field experienced considerable drilling deeper activity during the period, having a total of eighteen wells drilled to the deeper horizons. Most of the production was obtained from the Balltown and Kane Sands.

There were eighteen wells drilled deeper in the New Freeport Field within the period 1925 to 1936. This field experienced extensive drilling

deeper activity in previous years, but was still very active during the present period. The majority of the wells obtained their supply of gas from the Bayard Group of sands.

The Belle Vernon Field experienced sixteen drilling deeper operations, which for the most part encountered additional production in the Bayard Stray sand.

The Kiefer Field accounted for eighteen drilling deeper operations. Most of these wells obtained their production in the Bayard Group of sands. This extended the drilling deeper operations in this sand from the preceding period when considerable production was obtained.

Fourteen wells were drilled deeper in the Gump Field, and production was chiefly obtained from the Bayard Stray sand.

In the Somerset Field, the drilling deeper activity amounted to fourteen operations. Additional gas was found in the Bayard sand in most cases. Production from this sand by drilling deeper was first obtained in the preceding period.

The Grapeville-Arona Field again showed an increase in drilling deeper activity over the preceding period, there being fifteen wells drilled to the deeper producing sands. Most of these wells obtained their production from the Second Bradford Sand.

The Coheenville Field showed no change in the amount of drilling deeper activity as compared with the previous period, since ten wells were drilled deeper in both periods. The production obtained from the Tiona sand was responsible for the major portion of this drilling deeper activity.

The remaining fields which were active in drilling deeper operations during this period, were unimportant individually, but the total additional

production resulting from these operations increased the Company's gas supply to a considerable extent. A total of two hundred eighty-seven wells were drilled deeper during the period in fields where this type of activity had been carried on previously.

Production During the Period:

The yearly production from 1925 to 1936 was as follows:

1925 - 5,454,766M	1931 - 4,568,862M
1926 - 6,148,255M	1932 - 2,783,626M
1927 - 5,859,398M	1933 - 2,812,075M
1928 - 7,068,905M	1934 - 3,150,717M
1929 - 6,451,119M	1935 - 4,486,697M
1930 - 6,262,014M	1936 - 6,045,209M

TOTAL - 61,091,643M

The above figures afford an explanation of the absence of any new drilling after 1931. It is apparent that the loss of markets because of the depression in the period from 1931 to and including 1936 was so drastic that the need for new wells to maintain production was nil.

However, it should be noted that it was necessary to drill new wells in order to maintain from 1925 to 1930, even though the production during each of these years was considerably less than any yearly period in the Company's history prior to 1925. This illustrates the trend of a decreasing capacity to produce per well which has been noticeable in the Company's operations since 1909.

The average drop in production for this twelve year period represents a decrease of about 44% in yearly production over the yearly production for the period ending in 1924.

Reserve Added During the Period:

It was noted in the portion of this report dealing with the period prior

to 1924, that the increasing difficulty of finding new gas supplies was reflected by the inability of the Company to develop as much reserve as was withdrawn for production. This condition was more serious in the twelve year period ending in 1936, as the Company developed only 22,361.8Ml. cubic feet in this period or just slightly in excess of one-third of the gas withdrawn. This reserve was obtained from the following sources: 11,314.5Ml. cubic feet from new wells drilled on previously unoperated leases; 2,660.8Ml. cubic feet from new wells drilled on operated leases; 1,372.5Ml. cubic feet from purchased wells, and 7,014.0Ml. cubic feet from wells drilled deeper.

The importance of the deeper sand reserves is again illustrated by the relatively high percentage of the reserve developed which resulted from drilling deeper operations.

The average reserve per new well drilled was 59,469,000 cubic feet for this period and 23,485,000 cubic feet per well drilled deeper.

Depletion and Abandonments:

One of the most significant trends indicated by operations during this period is the rapid pace of depletion. During the period, three hundred forty-two wells were abandoned or sold, as contrasted to only one hundred ninety-seven being added to the Company's holdings. As a result of these abandonments, it is estimated that 17,710 acres were surrendered from operated leaseholds because of depletion. Since only 11,454 acres became operated during the period, there was a total downward change in operated leases of 6,538 acres (estimated). This is the first time in the Company's history when operated acreage actually decreased.

When the large decrease in withdrawals is taken into consideration, it is evident that the rate of depletion has indeed increased very rapidly

during this period.

A glance at the Map on Page 23 will indicate to the reader the areas in which depletion was most rapid during the period. It is a noticeable factor in the old Frogtown Field of Clarion County, and is also a very pronounced trend in most of the producing areas of Allegheny County. At the end of 1936, the depleted portions of the Company's holdings in Allegheny County are greater than the producing areas. Depletion became rapid enough to be definitely noticeable as a trend in Greene County during this period, and is indicative that this important area, from the standpoint of gas production for the Company, has definitely passed the stage of development, and in the near future, much larger areas will be depleted than are added by new operations.

Effect of Developments on the Company's acreage Holdings:

The Company had 244,972 acres of unoperated leases at the beginning of this period and 297,935 acres at the end of 1936, thus showing a net gain of 52,963 acres for the period.

Much of the acreage held at the end of the period was different than that held in the beginning, as 150,740 acres were surrendered, and 220,915 were acquired within the period. This indicates that about seventy percent of the acreage was sifted and exchanged for acreage in other areas which looked more favorable.

The possibilities of the deep horizons such as the Onondaga and Oriskany as indicated by drilling in Northern Pennsylvania and New York, and in West Virginia, together with the small fields in Beaver County and in Fayette County, which have been described above, had a profound influence on the Company's selection of acreage during this period. Practi-

cally all of the gas pools producing in the Oriskany sand are known to be located in areas where the structure of the rocks is favorable (a typical structure has been described elsewhere in this report); hence it was deemed advisable to obtain acreage along anticlinal trends, especially in those areas where closure or dome like structure was known.

It is safe to say that at least eighty per cent of all acreage acquired by the Company during this period was so located, and acreage located on structure, which came up for renewal, was renewed wherever possible. It should be borne in mind that good structure is also a favorable factor for shallow production, therefore, it was deemed advisable to secure acreage on anticlines in preference to any other territory at this time. It protected the Company for future reserves, both in the shallow sand, and in the deep sands, if exploration being carried on in the deeper sands should meet with success. The sifting of acreage during this period was thus directed toward structurally well located acreage.

The Company had 99,373 acres of operated leaseholds at the beginning of this period, and 11,454 acres were added as a result of drilling, together with 668 acres acquired through purchase of wells. However, 17,710 acres of operated leases were surrendered because of depletion, thus leaving the Company 92,835 acres at the end of the period. This indicates a net loss of 6,538 acres of operated leases, the first time in the Company's history that this class of acreage was decreased. This decrease was due to the lack of drilling operations from 1931 to 1936, together with an increased rate in the number of wells becoming exhausted.

S U M M A R Y

HISTORY OF DRILLING DEVELOPMENT OF

THE PEOPLES NATURAL GAS COMPANY

1886 TO 1936, INCLUSIVE

SUMMARY HISTORY OF DRILLING DEVELOPMENT - PEOPLES NATURAL GAS COMPANY

Statistical Summary of All Operations 1886 to 1936, Inc.

Producing Wells:

No. Active Wells End of 1936	1,081
No. Producing Wells Drilled	1,540
No. Wells Purchased	392
No. Dry Holes Drilled	285
No. Wells Abandoned or Sold	851

Data on New Wells:

No. of New Wells Drilled	1,825
Total Footage Drilled	(**) 4,705,719'
Average Depth of Wells	2,579

Drilling Deeper:

No. of Wells Drilled Deeper	764
Total Footage From Drlg. Deeper	575,834'
Avg. Addtl. Footage Per Well	754'

Source of Production:

New Wells		Sands Drilled To	Drlg. Deeper	
No.	%Tot.		No.	%Tot.
527	28.8	30' & Above	125	16.3
484	26.5	Bayard Group	208	27.2
211	11.6	Speechley Grp.	74	9.7
563	30.9	Bradford Grp.	299	39.2
40	2.2	Below " "	58	7.6

Acreage:

Unop. Acreage Beginning of Per.	0.00
Unop. Acreage at End of Period	297,935.16
Net Change in Unop. Acreage	297,935.16*
No. Ac. Going into Opr. from Unop.	90,923.60
Operated Acrg. at Beg. of Period	1.00
Opr. Acreage at End of Period	92,834.68
Net Change in Operated Acreage	92,833.68*
No. Acres Surr. During Period:	
Operated (Estimated)	42,914.61
Unoperated (Estimated)	438,187.45
No. Acres Acquired Dur. Period:	
Operated (Estimated)	46,823.95
Unoperated (Estimated)	827,175.73

Reserve and Production Data:#

Res. from New Wells, Unop. Leases	137,540.80Ml.
Res. from New Wells, Opr. Leases	31,198.30Ml.
Res. from Purchased Wells	36,904.70Ml.
Res. from Drilling Deeper	31,490.40Ml.
Total Additional Reserve	237,134.20Ml.

Total Production: (1905-1936 Inc) 278,267.950M.

*-Net change indicated does not balance exactly with detail of acreage turnover due to inadequate records:

Difference	(Unoperated)	-129.52
	(Operated)	-1,998.26

(**) - 22 Wells with "No Record"

"No Record" wells not used

- Reserve data lacking on all wells drilled prior to 1913. Reserve after that date for earlier wells is given.

(Ø) No Record for First Period (1886 to 1904 Inc.)

The Map on Page 23 will indicate the extent and distribution of areas from

which the Peoples Natural Gas Company has developed and produced gas since its first operation near Murrys ville in 1886, down to and including 1936. It will be noted that these areas are confined to nine Counties in Southwestern Pennsylvania, i.e., Clarion, Armstrong, Westmoreland, Allegheny, Washington, Greene, and very small portions of Jefferson, Indiana and Beaver Counties.

A large portion of the area between the developed portions of these Counties as shown by The Peoples Natural Gas Company operations have been developed by other

Companies. The Map on Page 5 indicates the extent of development by all Companies as of 1889, and the Map on Page 6 shows the extent of development as of 1936. Both of these Maps are reproduced from reports of the Pennsylvania Geological Survey, and should be reasonably accurate.

A total of 64 Fields have contributed to the supply of The Peoples Natural Gas Company. Many of these Fields were opened or extended by the company. It is of interest to note that the greater majority of the Fields had been discovered prior to 1909, but few of them were fully developed at this time. In recent years, there have been very few new Fields discovered, and it has been necessary to obtain the bulk of the new supplies of gas from deeper sands in the older Fields. By 1936, the majority of the Fields had been quite thoroughly explored through all of the Upper Devonian sands (down to and including the Kane sand), although some areas were not completely developed in all of the deeper horizons of the Upper Devonian.

During the 51 year period from 1886 to 1936, the Company drilled a total of 1,825 wells, of which 1,540 were productive wells and 285 were dry holes. The average depth of the wells drilled during the entire period was 2,579 feet. However, the average depth of wells was much greater in later years than in the earliest part of the period. Wells drilled prior to 1905 averaged only 1,735 feet; whereas, those drilled in the 12 year period ending in 1936 averaged 2,814 feet. The graph shown on page 124 indicates the trend toward deeper wells.

The Company purchased a total of 392 wells in the 51 year period. The majority of the purchased wells were obtained early in the Company's history when many smaller Companies were taken over through consolidation and outright purchase.

During the Company's history, a total of 764 wells

were drilled deeper in an effort to obtain new production from deeper sands after the upper producing sands had been exhausted. The average depth of a drilling deeper operation was seven hundred fifty-four feet. Drilling deeper operations were increasingly important in the latter years as a source of new reserves.

During the fifty-one years of active development of gas supplies, it is of interest to note that twenty-eight and eight tenths per cent of all wells drilled were carried to the producing sands down to and including the Thirty Foot; twenty-six and five tenths per cent of the wells were drilled to the Bayard group; eleven and six tenths per cent were drilled to the Speechley group; thirty and nine tenths per cent to the Bradford group, and two and two tenths per cent below the Bradford. In the earlier history of the Company, the sands above the Thirty Foot were the most important source of gas, as is indicated by the fact that until 1905, seventy-two and eight tenths per cent of all wells drilled were stopped in or above this horizon. In later years the deeper horizons such as the Bayard and Bradford were the principal objectives to which wells were drilled. The trend of drilling and the sources of production through the years are shown on the Graphs on Pages 120, 121, and 122.

The total production for the entire period of fifty-one years is not known, as there are no records which will show the amount of production prior to 1903. However, production from 1905 to 1936, inclusive, was 278,267,950M cubic feet. Production reached a yearly

peak in 1917 when a total of 14,041,262 M cubic feet was produced. This declined to a low of 2,783,626 M cubic feet in 1934, and was 6,045,209 M. cubic feet in 1936. It is of interest to note that this production was obtained from a total of 1,932 wells during the Company's history, although 851 wells had been abandoned up to the end of 1936, leaving a total of 1,081 active wells as of that date. The largest number of active wells in the Company's holdings during any one year was in 1925 when a total of 1,229 producing wells contributed to the Company's supply of gas.

Data is lacking as to the total reserve developed by the Company, as information essential to computing reserves was not kept until after 1913, and it is not complete until about 1920. However, it is estimated that at least 237,134.20 Ml. cubic feet was available or developed from 1913 to the end of 1936. These figures are very indefinite, and are intended only as an index to what may have been developed. The reserve developed per well has been much less in later years than in the early history of the Company when new flush fields were common.

As mentioned above, eight hundred fifty-one wells have been abandoned or sold since the Company first started operations. The bulk of these wells have been abandoned because of depletion. Data on the amount of acreage depleted prior to 1903 is not available, but a total of 42,915° acres have been surrendered since 1903 because of depletion.

The development of production involves the acquisition of leaseholds as the first step. Prospective acreage is constantly being acquired as it becomes available, and as drilling operations, both by the Company and others, progress, the least favorable areas are surrendered. All acreage holdings are constantly undergoing this shifting process which is essential for any Company in order that they may have a back-log of good unoperated acreage to supple-

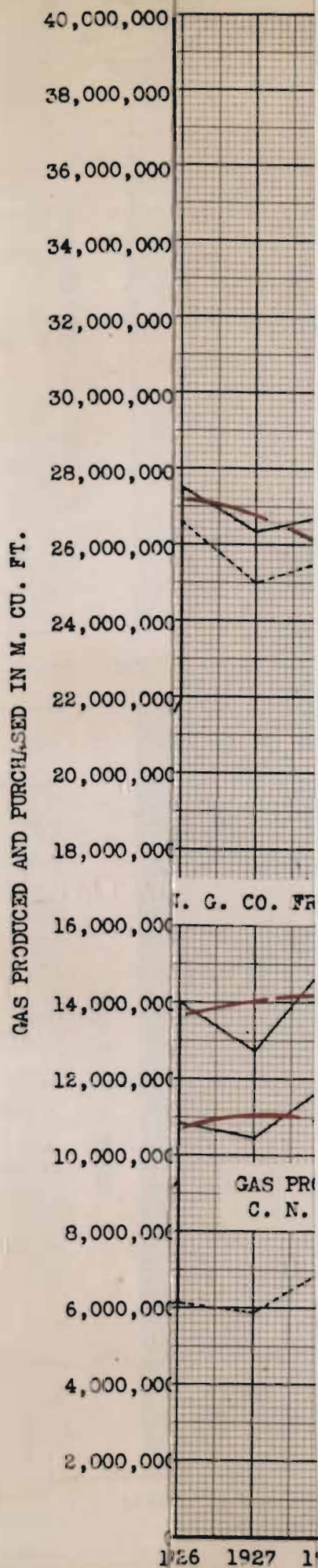
ment the areas which are depleted or nearly depleted, and thus maintain a constant supply of gas for the markets.

As mentioned above, data on the acreage holdings of the Company prior to 1903 are not available, as little or no accurate record was kept prior to this time. Since 1903, the Company has acquired a total of approximately 827,176 ⁰ acres, of which 297,935 acres are still being held as unoperated acreage. After deducting the 297,935 acres, still held as prospective acreage, from the 827,176 ⁰ acres acquired, there remains a total of 529,241 acres of unoperated leases which have been disposed of. Of this total, 90,924 acres have been proven and transferred to operated leaseholds, and 438,187 ⁰ acres have been surrendered. These figures indicate that the Company's experience from 1903 to 1936, shows that 17 2/10% of the acreage became operated, and 82 8/10% of the acreage was condemned by drilling operations on adjacent or nearby acreage. Thus it may be seen that for every acre of productive territory developed, a total of approximately 6 acres had to be handled.

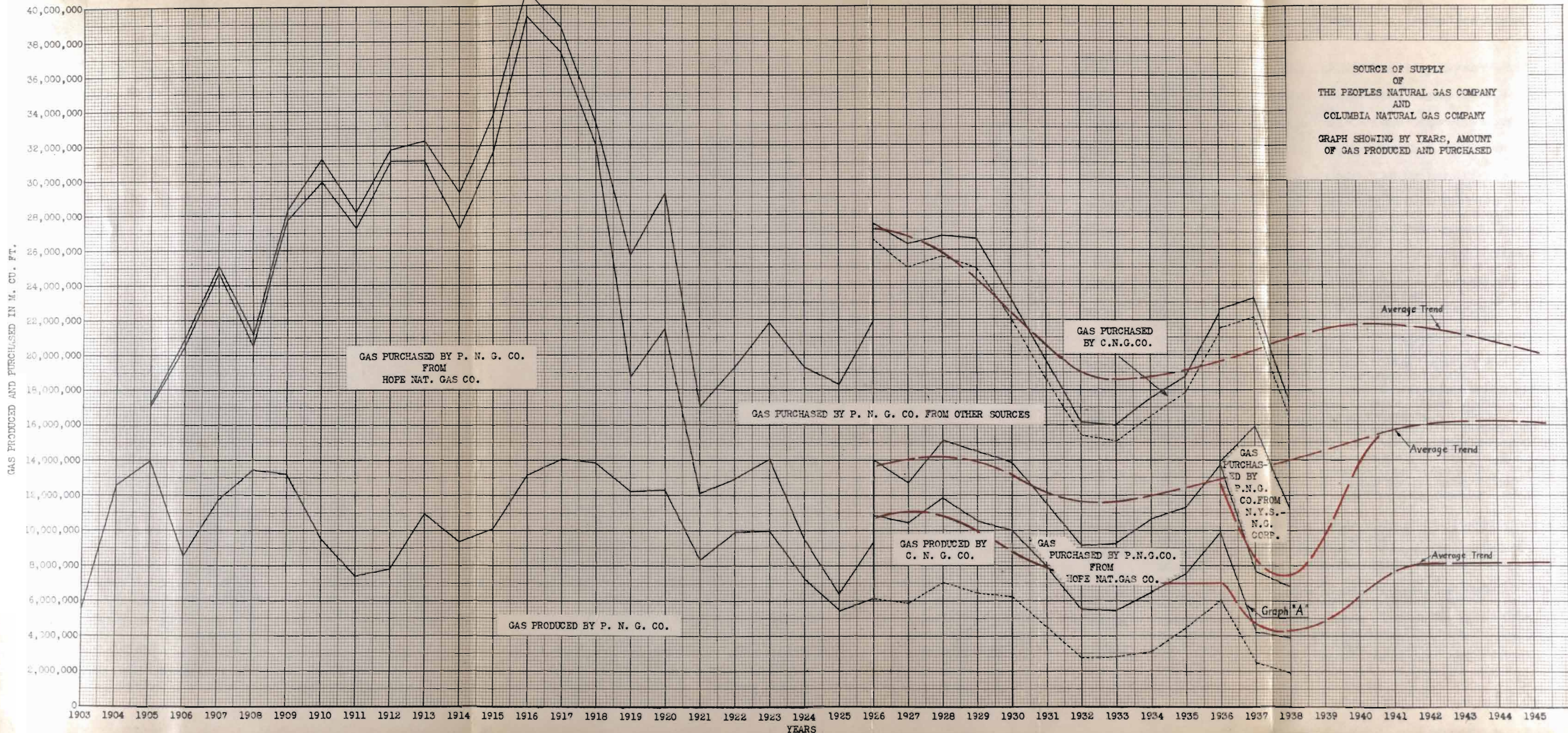
The Company developed a total of 90,924 acres and acquired through purchase, an additional 46,824 ⁰ acres. Thus a total of 137,748 acres of operated leases were available to the Company. Of this total, 42,915 ⁰ acres have been depleted since 1903, leaving a total of about 92,835 acres of operated leaseholds as of the end of 1936.

⁰ -- These figures are approximate - records not complete.

Chart 5



SOURCE OF SUPPLY
OF
THE PEOPLES NATURAL GAS COMPANY
AND
COLUMBIA NATURAL GAS COMPANY
GRAPH SHOWING BY YEARS, AMOUNT
OF GAS PRODUCED AND PURCHASED



THE PEOPLES NATURAL GAS COMPANY
(FORMER)

Graph Showing Trend of Drilling to Various Sand Groups

Fig. No. 1 - Graph Showing Total Number of Wells
Drilled Per Year.

Fig. No. 2 - Graph Showing Percentage of Wells
Drilled to Various Sand Groups By
Years

(Both Figures include purchased
wells where date of completion is known)

FIG.
NO. 1

NO. OF WELLS DRILLED

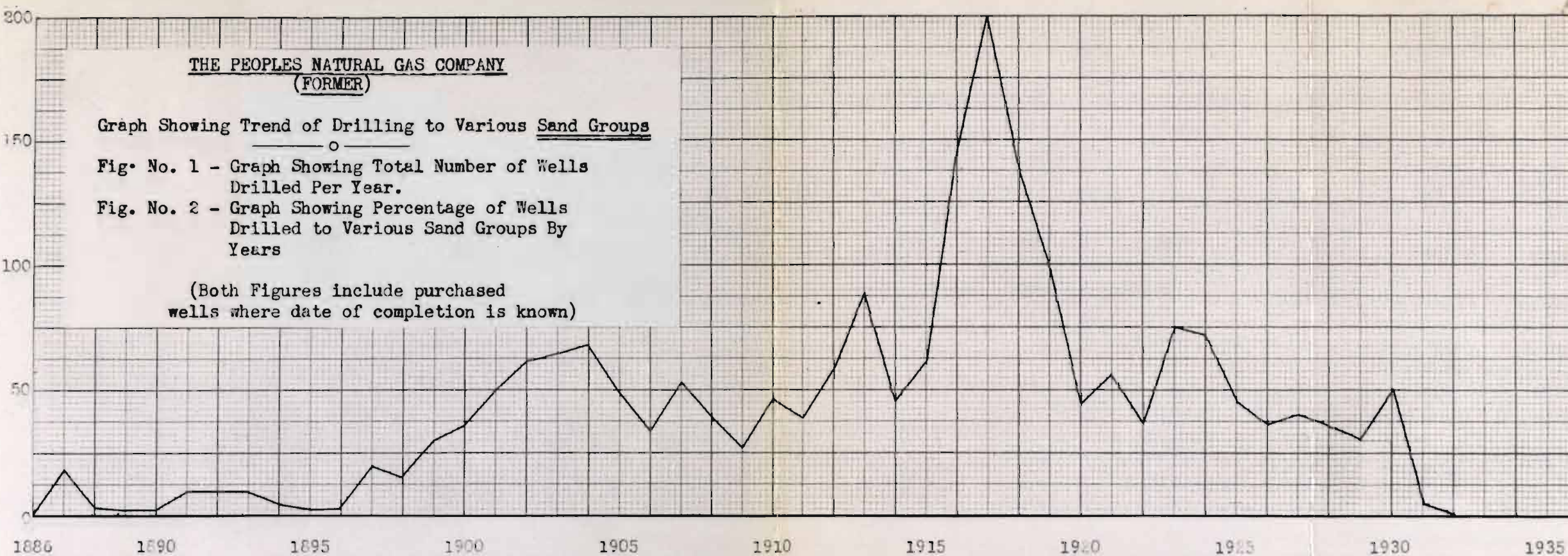
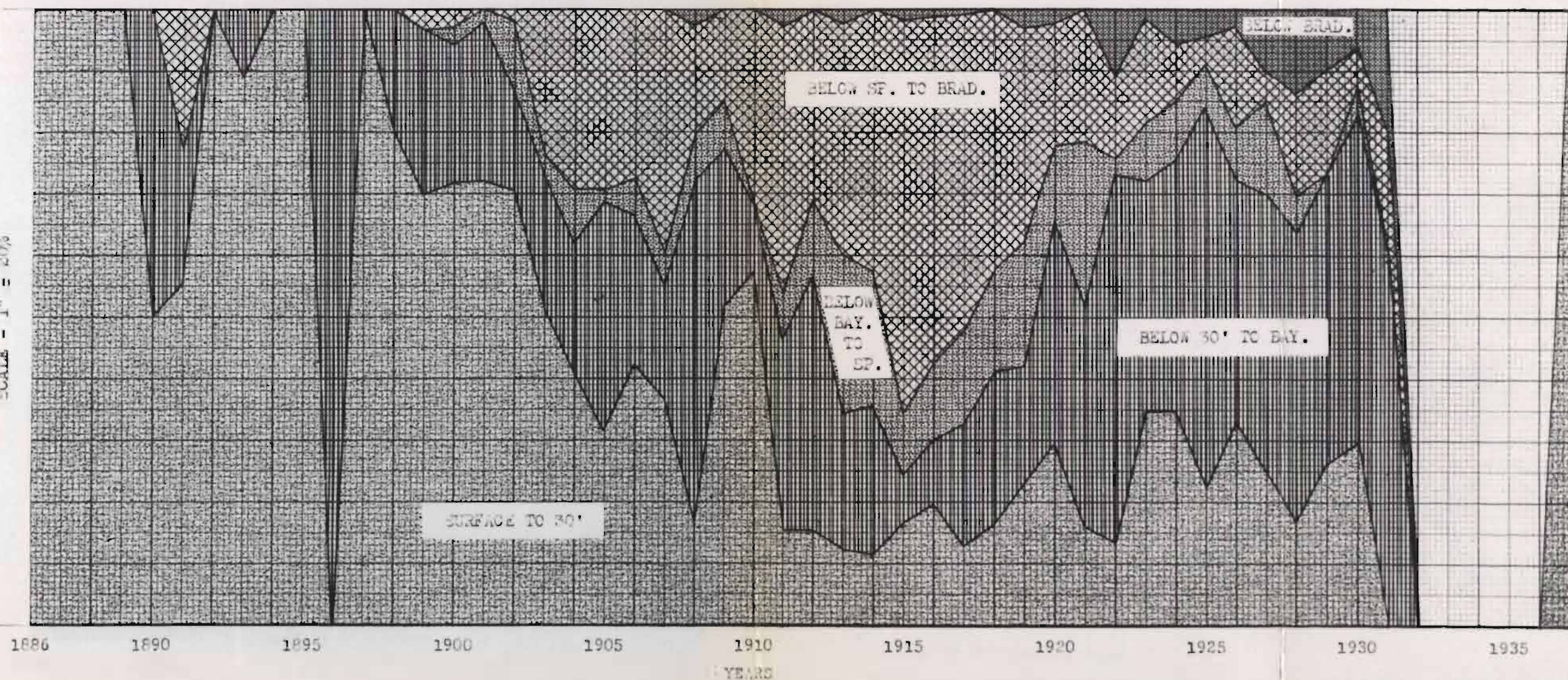


FIG.
NO. 2

SCALE - 1" = 20%



THE PEOPLES NATURAL GAS COMPANY
(FORMER)

Graph Showing Trend of Drilling to Various DEPTHS

Fig. No. 1 - Graph Showing Total Number Of Wells Drilled Per Year.

Fig. No. 2 - Graph Showing Percentage of Wells Drilled to Various Depths By Years.

(Both Figures include purchased wells where date of drilling is known.)

FIG. NO. 1

NO. OF WELLS DRILLED

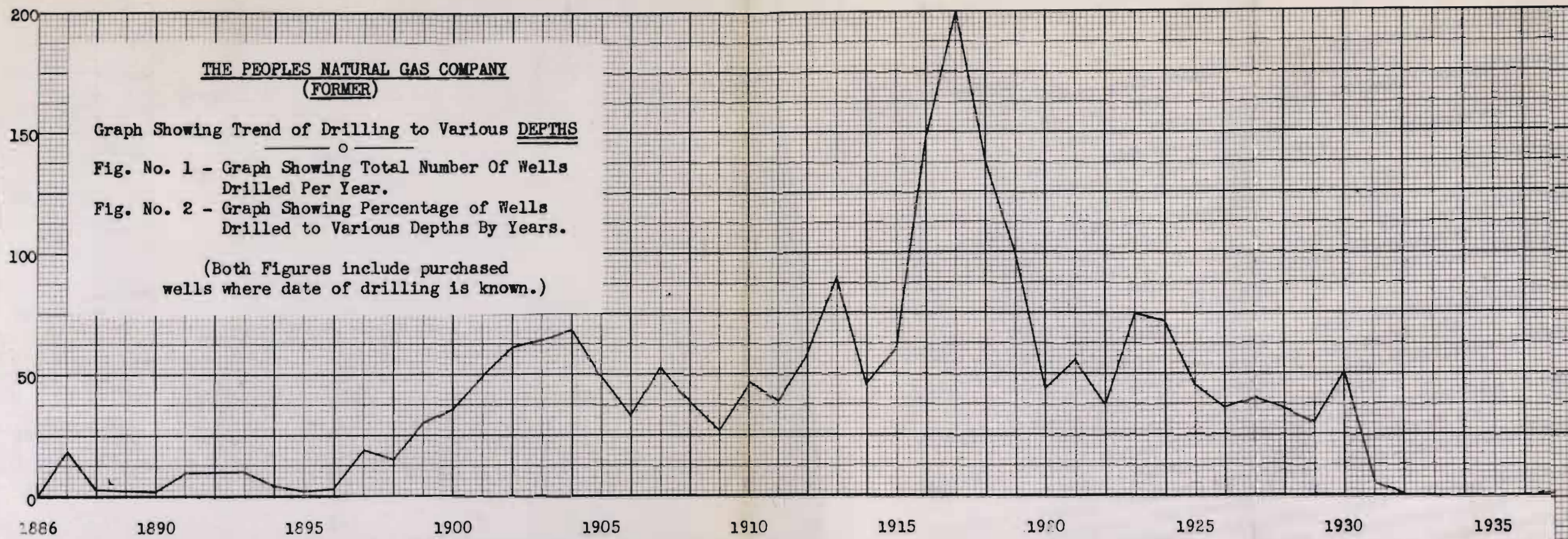
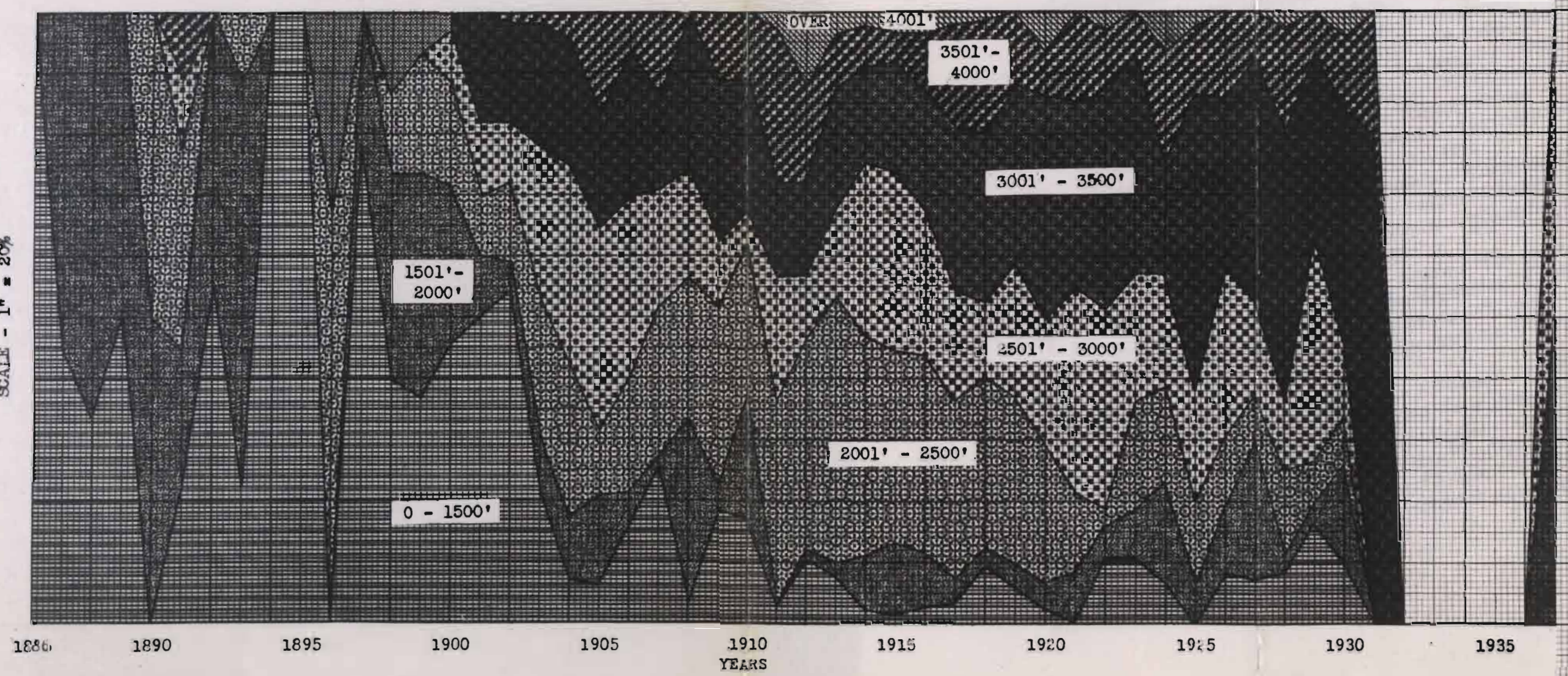


FIG. NO. 2

SCALE - 1" = 20%



THE PEOPLES NATURAL GAS COMPANY
(FORMER)

Graph Showing Trend of Drilling Deeper to Various Sand Groups

- Fig. No. 1 - Graph Showing Total Number of Wells Drilled Deeper By Years.
Fig. No. 2 - Graph Showing Percentage of Wells Drilled Deeper to Various Sand Groups By Years.

(Both Figures include purchased wells drilled deeper prior to purchase by Company, when date of drilling deeper is known.)

FIG. NO. 1
NO. OF WELLS DRILLED DEEPER

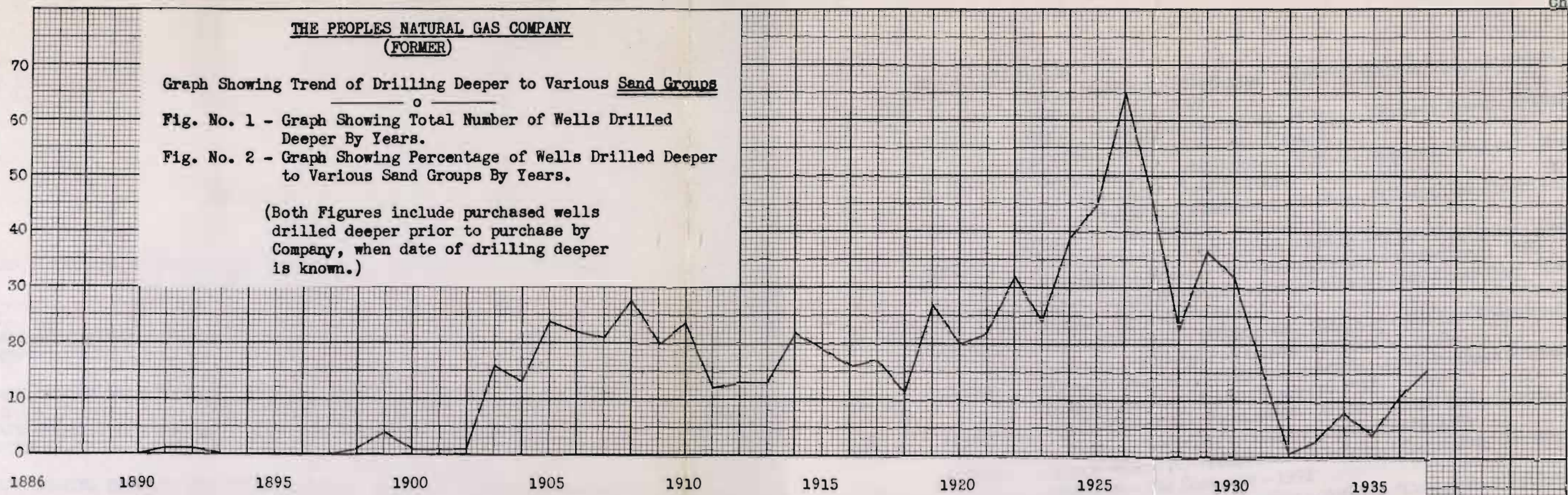
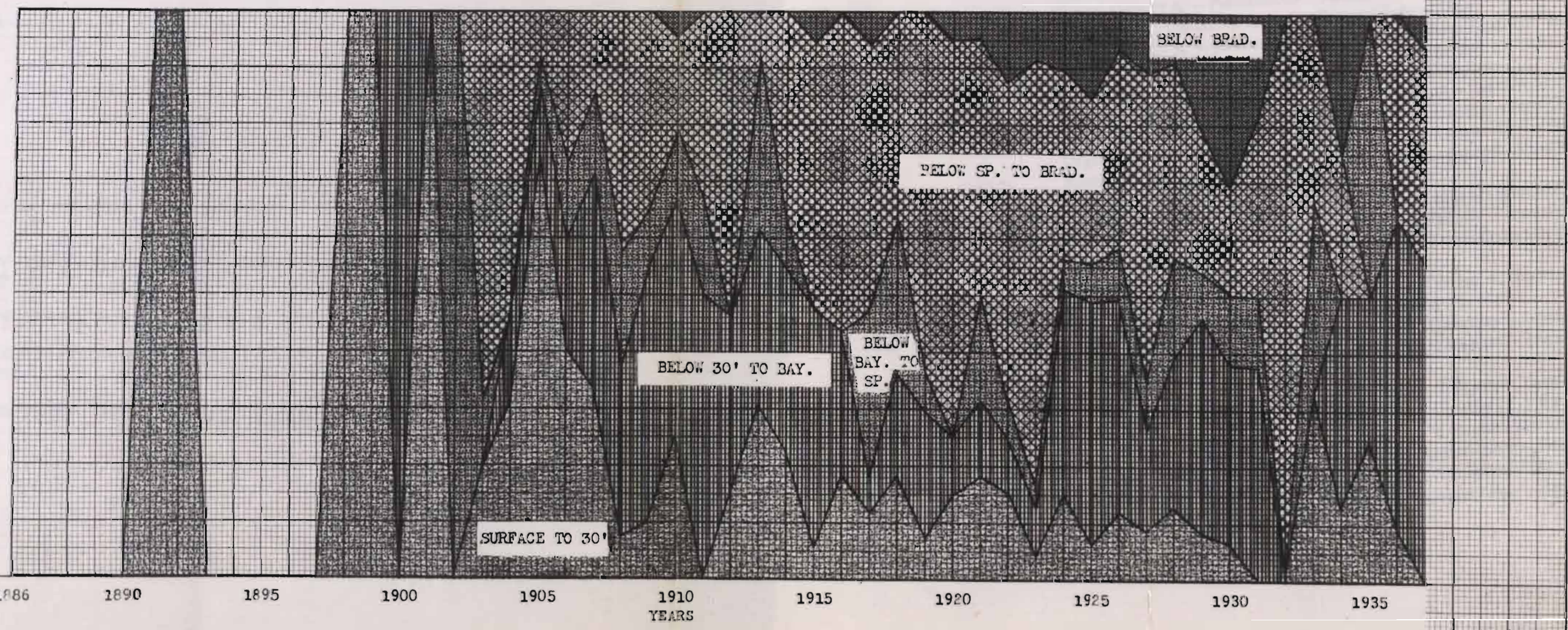


FIG. NO. 2
SCALE - 1" = 20%



SCALE - 1" = 200 WELLS

NEW WELLS

FIG.
NO. 1FIG.
NO. 2

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

FIG.
NO. 1AFIG.
NO. 2A

SCALE - 1" = 20%

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

PERIODS

WELLS DRILLED DEEPER

FIG.
NO. 3FIG.
NO. 4

SCALE - 1" = 100 WELLS

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

FIG.
NO. 3AFIG.
NO. 4A

SCALE - 1" = 20%

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

1887 1905 1910 1915 1920 1925
TO TO TO TO TO TO
1904 1909 1914 1919 1924 1936

PERIODS

NEW WELLS

NEW WELLS DRILLED, INCLUDING PURCHASED WELLS* OBTAINED AT LATER DATE, BUT COMPLETED IN THE YEAR SHOWN BY GRAPH.

FIG. NO. 1 - GRAPH SHOWING TOTAL NUMBER OF WELLS DRILLED PER PERIOD TO VARIOUS SAND GROUPS.

FIG. NO. 1A - GRAPH SHOWING TREND BY PERIODS OF SAND GROUPS DRILLED TO (SHOWN BY %).

FIG. NO. 2 - GRAPH SHOWING TOTAL NUMBER OF WELLS DRILLED PER PERIOD TO VARIOUS DEPTHS.

FIG. NO. 2A - GRAPH SHOWING TREND BY PERIODS OF DEPTHS DRILLED TO (SHOWN BY %).

*Includes Only Those Purchased Wells on Which the Date of Completion is Certain.

WELLS DRILLED DEEPER

WELLS DRILLED DEEPER, INCLUDING PURCHASED WELLS.

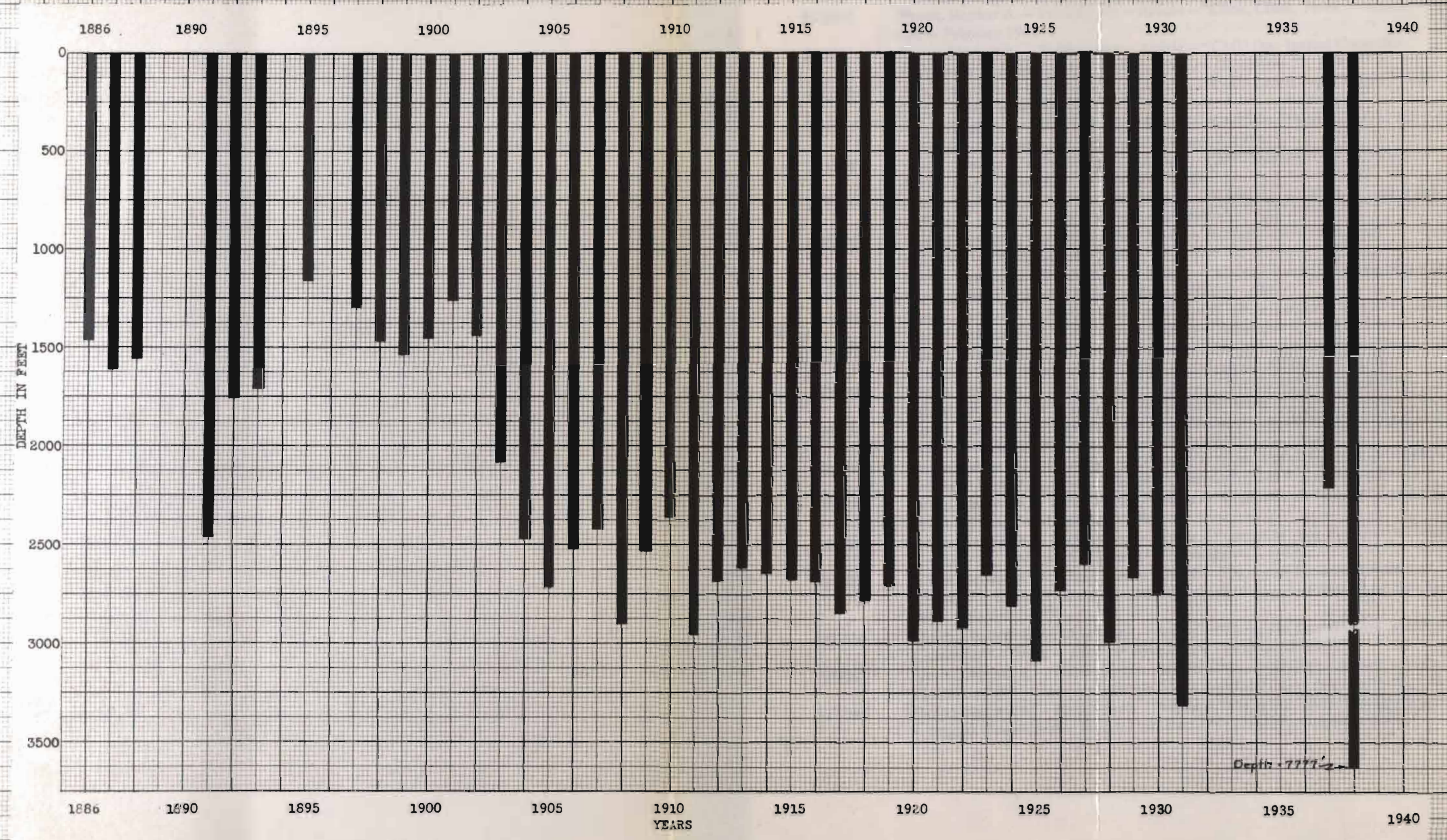
FIG. NO. 3 - GRAPH SHOWING TOTAL NUMBER OF WELLS DRILLED PER PERIOD TO VARIOUS SAND GROUPS.

FIG. NO. 3A - GRAPH SHOWING TREND BY PERIODS OF SAND GROUPS DRILLED TO (SHOWN BY %).

FIG. NO. 4 - GRAPH SHOWING TOTAL NUMBER OF WELLS DRILLED PER PERIOD TO VARIOUS DEPTHS.

FIG. NO. 4A - GRAPH SHOWING TREND BY PERIODS OF DEPTHS DRILLED TO (SHOWN BY %).

GRAPH SHOWING AVERAGE DEPTH OF
NEW WELLS DRILLED BY YEARS
(INCLUDING BOTH PRODUCING WELLS & DRY HOLES)



Depth 777' 2"

Chart 11

640
600
560
520
480
440
400
360
320
280
240
200
160
120
80
40
0
19

MILLIONS OF CUBIC FEET

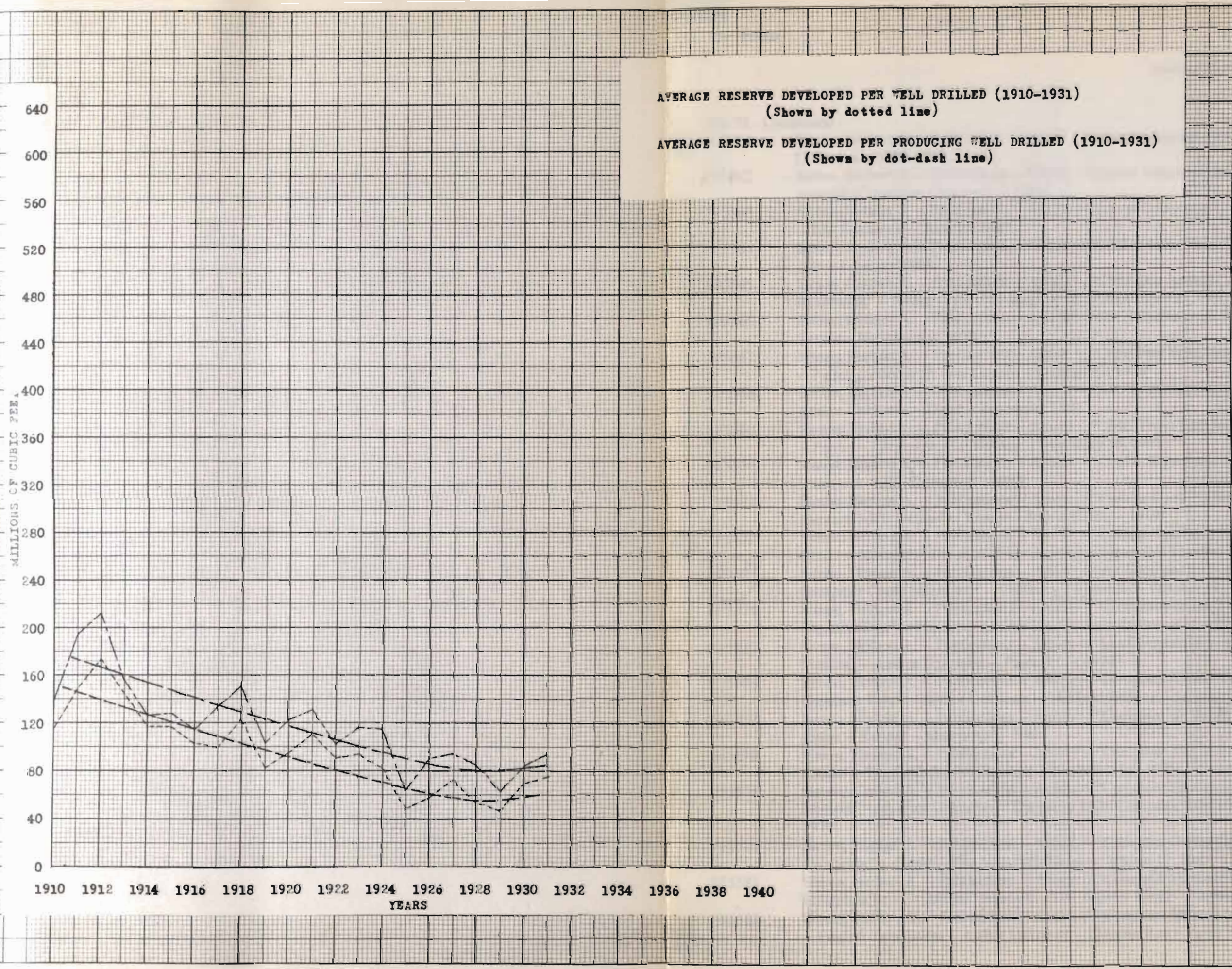
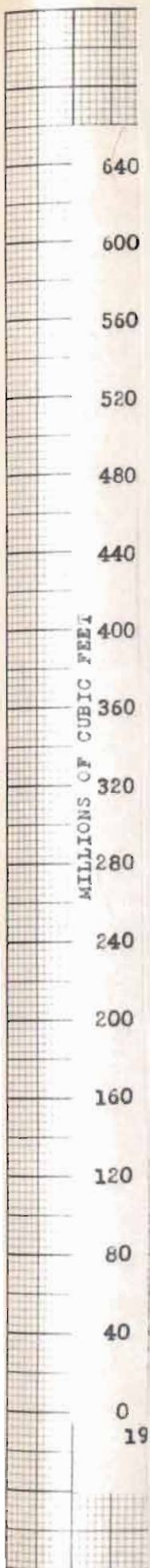
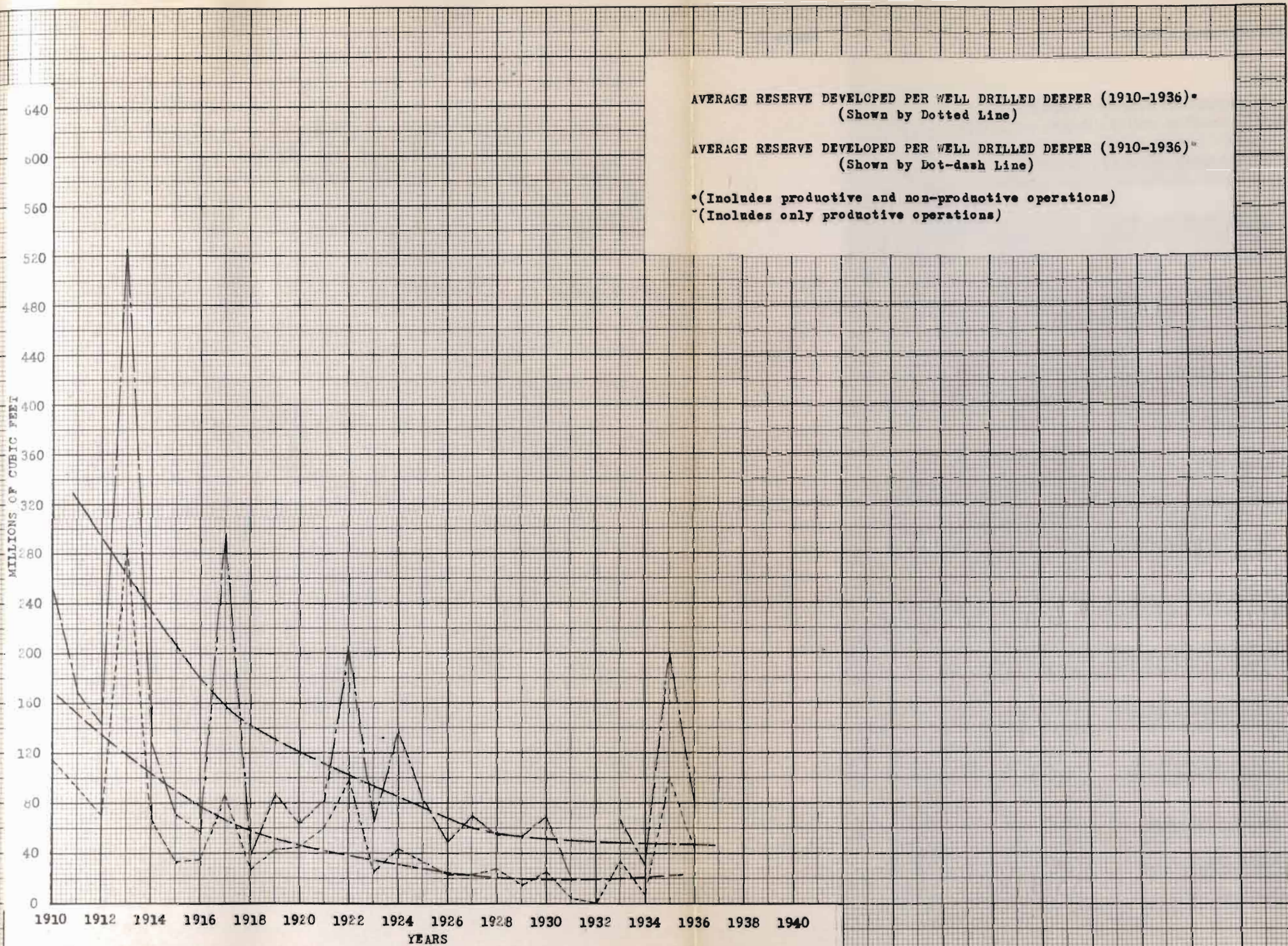


Chart 12





WELLS, ACTIVE, PRODUCING, DRILLED AND PURCHASED

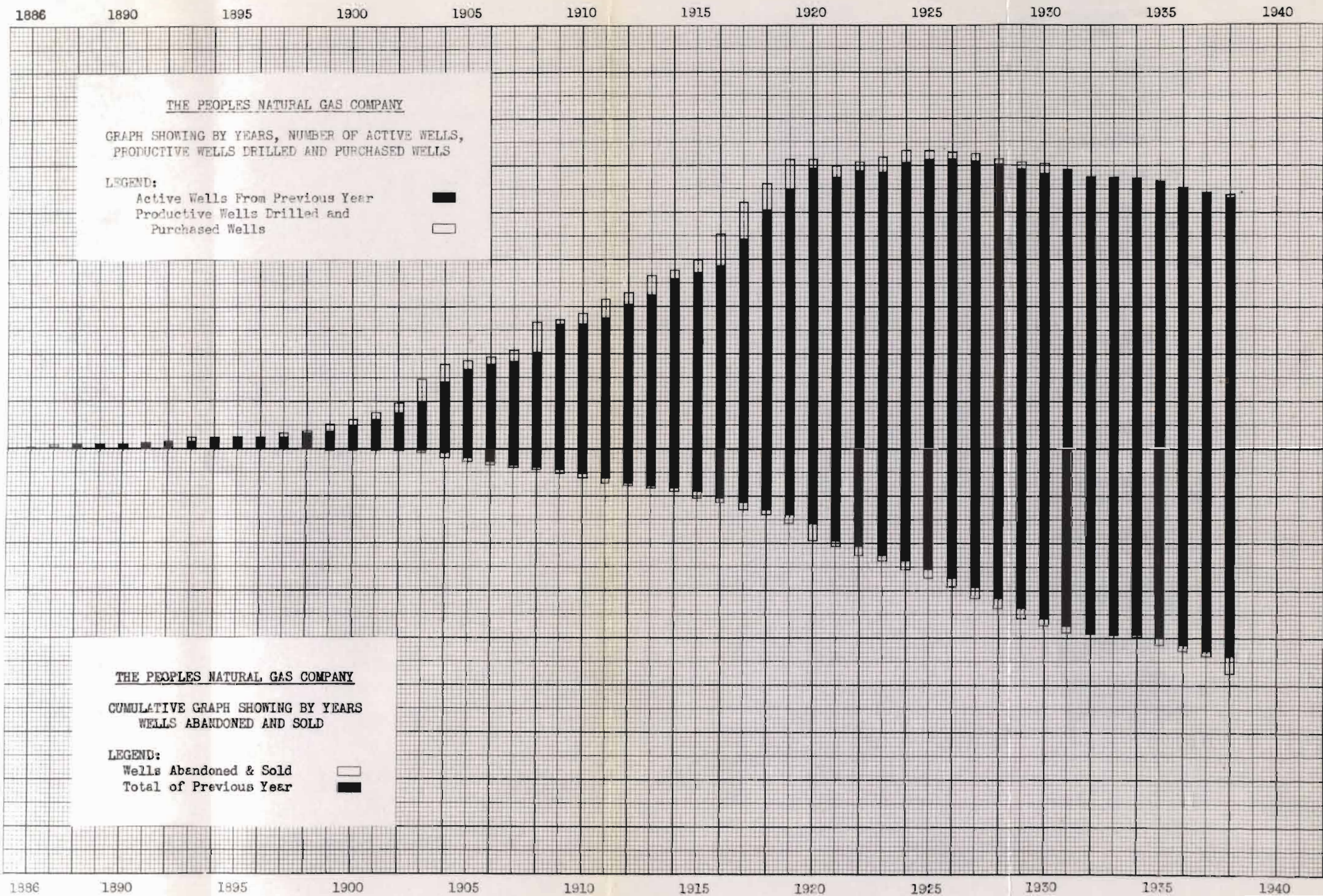


Table 1

THE PEOPLES NATURAL GAS COMPANY

TABLE SHOWING ESTIMATED RESERVE PER "WELL DRILLED
AND PER "WELL DRILLED DEEPER" AND PER "PRODUCTIVE
WELL" AND "PRODUCTIVE WELL DRILLED DEEPER

Y E A R	NEW WELLS					WELLS DRILLED DEEPER				
	Total Reserve By New Wells*	No. Of New Wells	Res. Per New Well*	No. New Prod. Wells [†]	Res./ New Prod. Well*	Reserve Develop- ed by D.D.*	No. Of Wells D.D.	Res. Per Well D.D.*	No. of Wells D.D. & Prod.	Res./ Prod. Well D.D.*
1910	5,139.1	45	114.2	37	138.8	2,527.7	22	115.0	10	252.8
1911	5,472.2	37	148.0	28	195.4	1,015.4	11	92.2	6	169.3
1912	9,553.3	55	173.7	45	212.4	857.8	12	71.5	6	142.9
1913	12,126.2	84	144.4	78	155.5	3,147.1	11	286.2	6	524.8
1914	4,660.8	40	116.6	37	126.0	1,425.3	21	67.9	11	129.6
1915	6,401.5	55	116.4	50	128.0	568.5	17	33.4	8	71.1
1916	14,335.7	139	103.2	125	114.6	454.4	13	34.9	8	56.8
1917	19,746.5	198	99.7	148	133.4	1,474.0	17	86.7	5	294.8
1918	16,821.3	136	123.7	111	151.5	274.8	10	27.5	7	39.3
1919	8,270.3	100	82.7	81	102.1	1,141.2	27	42.3	13	87.7
1920	4,149.0	44	94.3	34	122.0	888.9	20	44.4	14	63.5
1921	6,172.3	56	110.0	47	131.3	1,185.3	20	59.3	14	81.5
1922	3,161.9	35	90.4	31	102.0	3,072.1	31	99.0	15	204.8
1923	6,736.5	72	93.6	58	116.1	584.8	23	25.4	9	65.0
1924	5,729.9	70	81.9	50	114.6	1,646.6	38	43.3	12	137.1
1925	1,977.9	41	48.3	31	63.8	1,563.9	47	33.3	19	82.4
1926	2,074.4	36	57.6	23	90.2	1,479.6	65	22.8	30	49.3
1927	2,818.7	39	72.3	30	94.0	1,056.9	46	23.0	15	70.4
1928	1,868.8	35	53.4	22	85.0	487.1	18	27.1	9	54.1
1929	1,379.3	29	47.5	22	62.6	538.6	36	15.0	10	53.9
1930	3,478.6	50	69.6	41	84.8	833.4	32	26.0	12	69.4
1931	377.6	5	75.5	4	94.4	63.9	16	4.0	3	21.3
1932	-	-	-	-	-	0.0	1	0.0	0	-
1933	-	-	-	-	-	66.8	2	33.4	1	66.8
1934	-	-	-	-	-	61.9	8	7.7	2	30.9
1935	-	-	-	-	-	400.0	4	100.0	2	200.0
1936	-	-	-	-	-	461.9	11	42.0	6	76.9

* - Reserve Figures given in Millions of Cubic Feet

† - Does not include wells sold same year in which they were drilled, since no reserve data is available.

Table 2

[illegible]

STATISTICS ON DEVELOPMENT OF PRODUCTION OF THE PEOPLES NATURAL GAS COMPANY
INCLUDES ONLY OPERATIONS DURING OWNERSHIP BY THE PEOPLES NATURAL GAS CO.

GROUP "A"										GROUP "B"										GROUP "C"	GROUP "D"			
THE PEOPLES NATURAL GAS COMPANY WELL DATA										RESERVES AVAILABLE FROM NEW DRILLED DEEPER AND PURCHASED WELLS AT TIME OPERATION COMPLETED														
YEAR	TOTAL DRILLED	NO. DRY HOLES	NUMBER PRODUCING	NUMBER PURCHASED	TOTAL PRODUCING & PURCHASED	NO. SOLD	NUMBER ABANDONED	TOTAL	TOTAL NO. OF ACTIVE WELLS AT END OF YEAR	NUMBER PRODUCING	NO. DRY	TOTAL	RESERVE FROM WELLS ON PREVIOUSLY UNOPERATED LEASES	RESERVE FROM WELLS ON PREVIOUSLY OPERATED LEASES	TOTAL RESERVE FROM NEW WELLS	AVERAGE RESERVE PER PRODUCING WELL	AVERAGE RESERVE PER WELL DRILLED	RESERVE FROM DRILLING DEEPER	TOTAL RESERVE FROM NEW WELLS AND DRILLING DEEPER	RESERVE FROM WELLS PURCHASED	TOTAL RESERVE AVAILABLE	PRODUCTION FOR YEAR	NO. OF FIELDS OPERATED IN FOR FIRST TIME BY P. N. G. CO.	NO. OF FIELDS DRILLED DEEPER FOR FIRST TIME BY P. N. G. CO.
COLUMN NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
					3, 4			6, 7				10, 11			13, 14	15, 16	17, 18		15, 18		15, 18, 20			
1886	1	0	1	0	1	0	0	0	1				86.1	-	86.1	86.1	86.1	-	86.1	-	86.1	-	1	-
1887	16	0	16	0	16	0	0	0	17				89.9	134.8	224.7	14.0	14.0	-	224.7	-	224.7	-		
1888	2	0	2	0	2	0	0	0	19				56.3	51.8	108.1	54.1	54.1	-	108.1	-	108.1	-		
1889	0	0	0	0	0	0	0	0	19				-	-	-	-	-	-	-	-	-	-		
1890	0	0	0	0	0	0	0	0	19				-	-	-	-	-	-	-	-	-	-		
1891	6	0	6	1	7	0	0	0	26				89.1	-	89.1	14.9	14.9	-	89.1	62.5	151.6	-	-	
1892	5	0	5	0	5	0	0	0	31				27.7	-	27.7	5.5	5.5	-	27.7	-	27.7	-	2	
1893	9	0	9	10	19	0	0	0	39				311.1	-	311.1	34.6	34.6	-	311.1	122.1	433.2	-	4	
1894	0	0	0	0	0	0	0	0	50				-	-	-	-	-	-	-	-	-	-		
1895	1	0	1	0	1	0	0	0	51				17.8	-	17.8	17.8	17.8	-	17.8	-	17.8	-		
1896	0	0	0	0	0	0	0	0	51				-	-	-	-	-	-	-	-	-	-		
1897	15	0	15	0	15	0	0	0	66				261.5	13.1	274.6	18.3	18.3	-	274.6	-	274.6	-	1	
1898	10	0	10	0	10	0	0	0	76				167.8	4.1	168.2	16.8	16.8	-	168.2	-	168.2	-	-	
1899	22	0	22	4	26	0	2	2	100				496.5	38.0	534.5	24.3	24.3	-	534.5	6.9	541.4	-	2	
1900	23	0	23	1	24	0	0	0	124				277.1	183.1	460.2	20.0	20.0	-	460.2	-	460.2	-	1	
1901	28	1	27	2	29	0	0	0	153		1	1	614.1	30.0	632.1	24.2	23.3	-	632.1	169.6	801.7	-	1	
1902	39	0	39	2	41	0	0	0	194		1	1	2,125.0	272.2	2,397.2	61.5	61.5	60.1	2,457.3	-	2,457.3	-	1	
1903	31	4	27	2	33	8	6	14	201		7	15	587.8	638.7	1,226.5	39.6	39.6	347.6	1,574.1	12,270.6	13,844.7	5,557,188	7	
1904	19	7	12	41	77	7	15	22	336		4	11	1,192.6	951.6	2,144.2	59.6	59.6	392.2	2,536.4	2,486.8	5,023.2	12,550,828	6	
1905	41	7	34	3	37	2	13	15	358		8	14	3,038.6	167.5	3,206.1	94.3	78.2	579.7	3,785.8	300.6	4,086.4	13,980,234	1	
1906	29	1	28	4	32	1	14	15	371		5	13	1,341.0	293.9	1,634.9	68.1	65.4	262.3	1,897.2	599.5	2,496.7	8,531,010	-	
1907	48	8	40	6	46	3	7	10	407		14	21	4,521.3	598.3	5,119.6	128.0	106.7	1,140.0	6,259.6	259.4	6,519.0	11,762,367	2	
1908	36	5	31	97	128	0	2	2	528		9	18	3,654.0	889.7	4,543.7	186.6	126.2	1,032.0	5,575.7	7,299.3	12,875.0	13,416,128	6	
1909	23	5	18	0	18	0	16	16	528		7	13	3,013.6	47.3	3,060.9	170.1	133.1	490.6	3,551.5	-	3,551.5	13,215,444	1	
1910	45	7	38	5	43	1	17	18	553		10	12	4,279.1	860.0	5,139.1	135.2	114.2	2,527.7	7,666.8	776.2	8,443.0	9,570,665	4	
1911	37	9	28	51	79	3	21	24	608		6	5	4,223.5	1,248.7	5,472.2	195.4	147.9	1,015.4	6,487.6	4,665.9	11,153.5	7,414,355	2	
1912	55	9	46	5	51	1	8	9	650		6	12	6,064.0	2,689.3	8,753.3	207.7	173.7	857.8	10,611.1	1,827.6	12,438.7	7,801,806	3	
1913	84	6	78	2	80	1	10	11	719		6	5	8,172.1	3,954.1	12,126.2	155.5	144.4	3,147.1	15,273.3	435.3	15,708.6	10,963,966	2	
1914	40	3	37	1	38	1	14	15	742		11	10	3,634.4	826.4	4,460.8	128.0	116.5	1,323.3	5,783.1	519.8	6,302.9	9,382,830	-	
1915	55	5	50	7	57	3	22	25	774		8	9	5,442.7	958.8	6,401.5	128.0	116.4	568.5	6,970.0	669.4	7,639.4	10,100,508	2	
1916	139	13	126	8	134	1	19	20	888		8	5	11,841.0	2,494.7	14,335.7	113.6	103.1	454.4	14,790.1	1,475.4	16,265.5	13,152,893	2	
1917	198	50	148	6	154	1	32	33	1,009		5	12	17,050.6	2,695.9	19,746.5	153.4	99.7	1,474.0	21,220.5	388.8	21,609.3	14,041,262	1	
1918	136	25	111	1	112	3	18	21	1,100		7	10	13,057.9	3,763.4	16,821.3	151.5	113.7	278.8	17,096.1	22.9	17,119.0	13,850,362	1	
1919	100	19	81	44	125	3	34	37	1,188		13	14	7,303.2	967.1	8,270.3	102.1	82.7	1,141.2	9,411.5	2,696.3	12,107.8	12,223,833	4	
1920	44	7	37	0	37	41	32	73	1,152		14	6	3,768.4	380.6	4,149.0	112.1	94.3	888.9	5,037.9	-	5,037.9	12,593,239	1	
1921	56	9	47	0	47	0	21	21	1,178		14	6	5,913.1	259.2	6,172.3	131.3	110.2	1,185.3	7,357.6	-	7,357.6	8,347,043	1	
1922	35	2	33	2	35	5	34	39	1,174		15	16	2,749.1	412.8	3,161.9	95.8	90.3	3,072.1	6,234.0	217.5	6,451.5	3,913,361	-	
1923	72	11	61	0	61	5	17	22	1,															

NOTE - RESERVES FOR WELLS DRILLED PRIOR TO 1910 IS THE RESERVE REMAINING AFTER 1913 WHEN DATA WAS FIRST AVAILABLE FOR ESTIMATING RESERVES.
(RESERVES COMPUTED AS OF JANUARY 1, 1926)

Table 3

ATTO OVAL OAK HTS#1 - NOTED TO SHAWNEE SPAN#1123900

GROUP "F"

PURCHASED WELLS OF KNOWN COMPLETION DATE BY YEARS OF COMPLETION - DEPTH AND SAND DATA

* NOTE - (COLLUMS 25, 26 AND 27)

SOME OF THE WELLS INCLUDED IN THESE FIGURES HAVE "NO RECORD" AND HENCE DO NOT CONTRIBUTE TO THE "TOTAL FOOTAGE" FOR THE YEAR IN QUESTION. THEREFORE THE TOTALS WITH ASTERISK WERE NOT USED TO OBTAIN THE "AVERAGE DEPTH".

REFERS TO COLLUMS 25, 26 AND 27 - GROUP "E"

ALSO

COLLUMS 25, 26 AND 27 - GROUP "D"

Table 4

FOR	YEAR	BARD DATA			
		1970-1972	1973-1975	1976-1978	1979-1981
		1970-1972	1973-1975	1976-1978	1979-1981
COUNT	YEAR	1970-1972	1973-1975	1976-1978	1979-1981
1986					
1987	2				
1988	1				
1989	2				
1990-1992	3				
1993	1				
1994	2				
1995	1				
1996-1998	3				
1999	1				
2000-2002	3				
2003	1				
2004	2				
2005	1				
2006	2				
2007	1				
2008	2				
2009	1				
2010	2				
2011	1				
2012	2				
2013	1				
2014	2				
2015	1				
2016	2				
2017	1				
2018	2				
2019	1				
2020	2				
2021	1				
2022	2				
2023	1				
2024	2				
2025	1				
2026	2				
2027	1				
2028	2				
2029	1				
2030	2				
2031	1				
2032	2				
2033	1				
2034	2				
2035	1				
2036	2				
2037	1				
2038	2				
2039	1				
2040	2				
2041	1				
2042	2				
2043	1				
2044	2				
2045	1				
2046	2				
2047	1				
2048	2				
2049	1				
2050	2				
2051	1				
2052	2				
2053	1				
2054	2				
2055	1				
2056	2				
2057	1				
2058	2				
2059	1				
2060	2				
2061	1				
2062	2				
2063	1				
2064	2				
2065	1				
2066	2				
2067	1				
2068	2				
2069	1				
2070	2				
2071	1				
2072	2				
2073	1				
2074	2				
2075	1				
2076	2				
2077	1				
2078	2				
2079	1				
2080	2				
2081	1				
2082	2				
2083	1				
2084	2				
2085	1				
2086	2				
2087	1				
2088	2				
2089	1				
2090	2				
2091	1				
2092	2				
2093	1				
2094	2				
2095	1				
2096	2				
2097	1				
2098	2				
2099	1				
2100	2				

GROUP "F" (CONTINUED)										GROUP "G"										(NEW - 1938)									
PURCHASED WELLS OF KNOWN COMPLETION DATE BY YEARS OF COMPLETION DEPTH AND SAND DATA (CONTINUED)										TOTAL NEW AND PURCHASED WELLS - DEPTH AND SAND DATA																			
SAND DATA					WELL DATA					DEPTH DATA										SAND DATA									
YEAR	30' & ABOVE	BAYARD GROUP	SPEECHLEY GROUP	BRADFORD GROUP	BELOW BRADFORD	NUMBER DRILLED	NUMBER PURCHASED	TOTAL	AVG. DEPTH	0 TO 1500'	1501 TO 2000'	2001 TO 2500'	2501 TO 3000'	3001 TO 3500'	3501 TO 4000'	4001' & BELOW	30' & ABOVE	BAYARD GROUP	SPEECHLEY GROUP	BRADFORD GROUP	BELOW BRADFORD								
COLUMN NUMBER	50	51	52	53	54	25	40	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69							
								(25 & 40)																					
1886						1	0	1	1,461	1,461	1	100.0						1	100.0										
1887	2	100.0				16 *	2	18	19,200	1,600	8	44.5	10	55.5				18	100.0										
1888	1	100.0				3 *	1	3	3,454	1,727	1	33.3	2	66.7				3	100.0										
1889	2	100.0				0	2	2	3,093	1,527	1	50.0	1	50.0				2	100.0										
1890	1	50.0	1	50.0		0	2	2	3,802	1,901	1	50.0	1	50.0				1	50.0	1	50.0								
1891	2	66.7		1	33.3	6 *	2	9	12,345	2,251	3	22.2	2	22.2	1	11.1		2	22.2										
1892	4	100.0				5 *	4	9	7,643	1,274	5	55.5	4	88.8				9	100.0										
1893	2	100.0				2	0	2	15,372	1,708	2	22.2	6	66.7	1	11.1		8	88.8										
1894	4	100.0				0	4	4	3,585	896	4	100.0						4	100.0										
1895	1	100.0				1	1	2	2,400	1,200	2	100.0						2	100.0										
1896	2	100.0	3	100.0		0	3	3	7,699	2,566			2	66.7				3	100.0										
1897	4	100.0				15 *	4	19	20,229	1,264	15	79.0	4	21.0				19	100.0										
1898	2	40.0	3	60.0		10	5	15	26,107	1,740	6	40.0	5	33.3	2	13.3		12	80.0										
1899	2	25.0	5	62.5	1	22 *	8	30	48,152	1,783	11	36.7	11	36.7	2	6.7		21	70.0	3	20.0								
1900	8	66.6	4	33.3		23 *	12	35	57,704	1,697	16	35.7	9	25.7	6	17.1		25	71.4	8	22.8	1	2.9						
1901	10	85.4	12	95.6		28 *	22	50	53,598	1,871	25	50.0	5	10.0	3	6.0		36	72.0	13	26.0								
1902	11	50.0	10	85.5	1	39 *	22	61	108,027	1,864	33	54.1	3	8.9	8	19.1		53	70.5	10	16.0	7	11.5						
1903	20	60.6	13	39.4		31 *	23	64	144,798	2,298	14	21.9	6	9.4	14	21.9		33	51.6	14	21.9	2	3.1						
1904	13	52.0	9	36.0	2	43	25	68	175,306	2,549	5	7.4	7	10.3	17	25.0		28	41.2	14	20.6	6	8.8						
1905	3	42.8	4	57.2		41	7	48	127,467	2,656	3	6.2	7	14.6	5	10.4		15	31.3	18	37.5	1	2.0						
1906	6	75.0	2	25.0		25	8	33	83,306	2,524	5	15.2	2	6.1	6	18.2		8	24.2	2	6.1								
1907	3	60.0	2	40.0		48	5	53	129,090	2,435	14	26.4	1	1.9	13	24.6		19	35.9	10	18.9	3	5.7						
1908	2	66.7	1	33.3		36	3	39	111,091	2,849	1	2.6	12	30.8	9	23.1		6	15.4	22	56.5	3	7.7						
1909	3	75.0			1	23	4	27	69,374	2,569	5	18.5	1	3.7	8	29.6		14	51.9	7	25.0	2	7.4						
1910	1	50.0			1	45	2	47	111,779	2,378	8	17.0	10	21.3	12	25.5		27	57.5	5	10.6								
1911	1	50.0	1	50.0		37	2	39	113,412	2,908	1	2.6	13	33.3	8	20.5		6	15.4	12	30.8	3	7.7						
1912					3	55 *	3	58	199,344	2,725	6	10.4	1	1.7	20	34.5		9	15.5	24	41.5	7	12.0						
1913	1	16.7		1	16.7	84	6	90	237,018	2,634	7	7.8	2	2.2	39	43.3		11	12.2	20	22.2	23	25.6						
1914	1	20.0	1	20.0	2	40	5	45	117,907	2,620	1	2.2	4	8.9	16	35.6		5	11.1	11	24.4	10	22.2						
1915	5	83.3			1	55	6	61	159,682	2,618	1	1.6	7	11.5	19	31.2		5	8.2	6	9.9	39	64.0						
1916	2	20.0			5	139	7	146	392,914	2,691	4	2.7	13	8.9	27	32.2		15	10.3	18	12.3	82	56.2						
1917						198	0	198	563,143	2,844	7	3.5	8	4.0	57	28.6		39	19.7	30	15.1	102	51.6						
1918	1	100.0				136	1	137	380,174	2,775	13	9.5	4	2.9	38	27.7		23	16.8	34	24.8	22	16.0						
1919						100	0	100	270,541	2,705	6	6.0	4	4.0	27	27.0		23	23.0	19	19.0	20	20.0						
1920			1	100.0		44 *	1	45	131,352	2,985	1	2.2	2	4.4	10	22.2		16	35.6	6	13.3	9	20.0						
1921						56	0	56	161,226	2,879			5	8.8	7	12.5		20	35.7	15	26.8	12	31.4						
1922	1	50.0	1	50.0		35	2	37	105,610	2,854	4	10.8	2	5.4	1	2.7		22	59.5	1	2.7	5	13.5						
1923	1	33.3	1	33.3	1	72	3	75	197,819	2,638	8	10.7	6	8.0	13	17.3		26	34.6	7	9.3	13	17.4						
1924	1	50.0	1	50.0		70	2	72	201,715	2,802	5	6.9	12	16.7	11	15.3		29	40.3	9	9.7	9	9.7						
1925	1	35.0	3	75.0		41	4	45	138,802	3,085	3	6.7	3	6.7	6	13.3		10	22.1	3	6.7	3	1.5						
1926						36	0	36	98,256	2,729			4	11.1	4	11.1		12	33.3										
1927			1	100.0		40	1	40	104,638	2,616	3	7.5	9	22.5	3	7.5		10	25.0	6	15.0	2	5.0						
1928	1	100.0				36	1	36	105,366	2,927	3	8.3	1	2.8	4	11.1		6	16.7	2	5.6	6	16.7						
1929			1	100.0		29	1	30	70,068	2,629	5	16.7	1	3.3	2	6.7		8	25.0			5	16.7						
1930						50	0	50	137,874	2,746	5	10.0	8	16.0	4	8.0		27	54.0	2	4.0	3	6.0						
1931						5	0	5	16,544	3,309								3	60.0			1	20.0						
1932																													
1933																													
1934																													
1935																													
1936																													
TOTALS 1886-1936	121	53.3	79	34.8	6	1,825 *	227	2,052	5,257,421	2,593	270	13.2	205	10.0	460	22.4		562	27.4	219	10.7	585	28.5						
1937						2	0	2	4,420	8,840			1	100.0				2	100.0										
1938						1	0	1	7,777	7,777																			
TOTALS 1886-1938	121	53.3	79	34.8	6	1,826	227	2,055	5,269,618	2,595	270	13.2	206	10.0	460	22.4		562	27.4	219									

NOTE - SOME OF THE WELLS INCLUDED IN THESE FIGURES HAVE "NO RECORD" AND HENCE DO NOT CONTRIBUTE TO THE "TOTAL FOOTAGE" FOR THE YEAR IN QUESTION; THEREFORE THE TOTALS WITH ASTERISK WERE NOT USED TO OBTAIN THE "AVERAGE DEPTH".

REFERS TO COLUMNS 25, 56 AND 57 - GROUP "G"

Table 5

P BY THE FEDERAL BUREAU OF INVESTIGATION

YEAR

PERCENT

COLLUSION
MAKING

%

1985

0

1987

0

1989

0

1990

0

1991

0

1992

0

1985-1992

0

TOTAL

1985

0

1986

0

1987

0

1988

0

1989-1992

0

TOTAL

1985

0

1986

0

1987

0

1988

0

1989

0

1990

0

1991

0

1992

0

1993

0

1994

0

1995

0

1996

0

1997

0

1998

0

1999

0

2000

0

2001

0

2002

0

GROUP "H"

WELLS OF KNOWN COMPLETION DATE OF DRILLING DEEPER - DEPTH AND SAND DATA (INCLUDES WELLS DRILLED DEEPER BEFORE PURCHASE)

DRILLED DEEPER WELL DATA					DEPTH DATA								SAND DATA																
YEAR	NUMBER PRODUCING	NUMBER DRY	TOTAL	TOTAL ADD. FOOTAGE	AVG. ADD. DEPTH	0 TO 1500'		1501 TO 2000'		2001 TO 2500'		2501 TO 3000'		3001 TO 3500'		3501 TO 4000'		4001' & BELOW	30' & ABOVE		BAYARD GROUP		SPEECHLEY GROUP		BRADFORD GROUP		BELOW BRADFORD		
COLUMN NUMBER	70	71	72	73	74	75		76		77		78		79		80		81	82		83		84		85		86		
			70+71																										
1886	0	0	0																										
1887	0	0	0																										
1888	0	0	0																										
1889	0	0	0																										
1890	0	0	0																										
1891	1	0	1	292	292			1	100.0											1	100.0								
1892	1	0	1	143	143			1	100.0											1	100.0								
1893	0	0	0																										
1894	0	0	0																										
1895	0	0	0																										
1896	0	0	0																										
1897	0	0	0																										
1898	1	0	1	1,024	1,024															1	100.0								
1899	3	1	4	1,173	294			3	75.0	1	25.0									4	100.0								
1900	1	0	1	154	154					1	100.0											1	100.0						
1901	1	0	1	NO REC.		1	NO REC.													1	100.0								
1902	1	0	1	1,492	1,492					1	100.0									3	18.7			1	100.0				
1903	13	3	16	16,453	1,154	2	12.5			5	31.2	8	50.0	1	6.3				4	30.8	2	15.4	2	12.5	11	68.8			
1904	9	4	13	11,340	874	3	23.1	1	7.7	1	7.7	6	46.1	2	15.4														
1905	14	10	24	9,599	393	9	37.5	7	29.1	3	12.5	4	16.7	1	4.2				18	75.0	3	12.5	1	4.2	2	8.3			
1906	113	8	121	13,881	661	9	14.3	3	14.3	4	19.1	7	32.2	4	19.1				8	38.0	4	19.1	3	14.3	6	28.6			
1907	13	8	21	13,786	636	2	9.5			2	9.5	4	19.1	6	28.6	2	9.5		7	33.3	8	38.1	3	14.3	3	14.3			
1908	17	11	28	21,762	776	2	7.1			4	14.3	9	32.1	9	32.1	4	14.3		2	7.1	8	28.6	6	21.4	12	42.8			
1909	10	11	21	14,147	675	1	4.7			6	28.6	5	23.8	6	28.6	3	14.3		2	9.6	9	42.8	2	9.6	8	38.0			
1910	15	5	20	17,639	735	3	12.5	2	8.3	2	8.3	1	4.2	11	45.8	5	20.8		6	25.0	10	41.7	3	12.5	4	16.7	1	4.2	
1911	6	6	12	12,417	1,035					1	8.3	2	16.7	5	47.7	4	23.3				6	50.0	2	16.7	4	33.3			
1912	8	5	13	12,745	980	1	7.7	1	7.7	2	15.4	3	23.1	3	23.1	3	23.1		2	15.4	4	30.8	4	30.8	7	53.8			
1913	8	5	13	9,814	755	2	15.4	1	7.7	4	30.8	2	15.4	4	30.8				4	30.8	4	30.8			4	30.8	1	7.7	
1914	13	9	22	18,802	855	1	4.5	1	4.5	8	36.4	2	15.4	7	31.8	6	27.3		5	22.7	7	31.8	2	9.1	8	36.4			
1915	12	7	19	23,929	1,256					4	21.0	1	5.3	6	31.6	5	26.3	3	15.8	1	5.3	8	42.1			9	47.4	1	5.3
1916	10	6	16	15,658	973	1	6.3	1	6.3	4	25.0			5	31.2	5	31.2		3	18.7	4	25.0			9	56.3			
1917	10	7	17	24,457	1,441					2	11.8	3	17.6	8	47.0	2	11.8	1	5.9	2	11.8	1	5.9	5	29.4	8	47.0	1	5.9
1918	8	3	11	13,409	1,220	1	9.1	4	36.4	1	9.1	3	27.2	3	27.2	2	18.2		2	18.2	2	18.2	3	27.2	4	36.4			
1919	15	12	27	31,077	1,150	1	3.7	2	7.4	5	18.5	14	51.9	5	18.5				2	7.4	6	22.2	2	7.4	17	63.0			
1920	13	7	20	17,333	867					5	25.0	8	40.0	5	25.0	1	5.0		3	15.0	2	10.0			14	70.0	1	5.0	
1921	15	7	22	20,863	950	1	4.5	2	9.1	2	9.1	8	36.4	4	18.2	4	18.2	1	4.5	4	18.2	3	13.6	4	18.2	10	45.5	1	4.5
1922	14	18	32	28,168	879	2	6.3	2	6.3	1	3.1	4	12.5	15	46.9	8	25.0		5	15.6	3	9.4	2	6.3	18	56.3	2	12.5	
1923	10	14	24	20,629	860					1	4.2	4	16.7	16	66.7	3	12.5		1	4.2	2	8.3	1	4.2	18	75.0	2	8.3	
1924	18	21	39	28,334	726			3	7.7	6	15.4	11	28.2	13	33.3	4	10.3	2	5.1	6	15.4	14	35.3	2	5.1	13	33.3	4	10.3
1925	26	22	48	34,464	719			2	4.2	2	4.2	12	25.0	22	45.8	10	20.8		3	6.3	19	39.6	4	8.3	15	31.2	7	14.6	
1926	36	29	65	32,041	494	2	3.1	2	3.1	6	9.2	27	41.5	16	24.6	12	18.5		8	12.3	24	37.0	6	9.2	23	35.4	4	6.2	
1927	23	23	46	28,751	624			1	2.2	7	15.2	19	41.3	11	23.5	7	15.2	1	2.2	4	8.7	8	17.4	4	8.7	25	54.3	5	10.9
1928	11	12	23	7,723	336	1	4.4	5	21.7	4	17.4	9	39.1	4	17.4				3	13.0	6	26.1	3	13.0	9	39.1	2	8.7	
1929	14	24	38	23,469	618			1	2.6	6	15.8	10	26.3	16	42.2	4	10.5	1	2.6	3	7.9	14	36.8	4	10.5	9	23.7	8	21.1
1930	14	20	34	21,754	572	1	2.9	1	2.9	3	8.3	5	14.8	20	58.8	4	11.8		2	6.0	10	29.4	3	8.8	9	26.4	10	29.4	
1931	6	12	18	6,473	359			1	5.6	5	27.8			6	33.4			3	16.6	6	33.4			3	16.6	5	27.8	4	22.2
1932	0	1	1	1,028	1,028											1	100.0								1	100.0			
1933	1	2	3	1,388	463					1	33.3					2	66.7			1	33.3				1	33.3			
1934	3	5	8	3,035	380			1	12.5	1	12.5	3	37.5	3	37.5				1	12.5	3	37.5			2	25.0	2	25.0	
1935	3	1	4	3,633	908					1	25.0			2	50.0				1	25.0	1	25.0							
1936	6	5	11	9,550	868					2	18.2	2	18.2	5	45.5	1	9.1	1	9.1	4	9.1	6	54.5	2	50.0	4	36.3		

THE PEOPLES NATURAL GAS COMPANY
FUNCTION OF UNOPERATED ACREAGE
IN A NATURAL GAS COMPANY
AND
A METHOD OF COMPUTING IN ADVANCE THE
AMOUNT OF ACREAGE REQUIRED

FUNCTION AND AMOUNT OF ACREAGE REQUIRED

Unoperated acreage to a gas Company may be likened to food for a man. A gas company must maintain a comfortable backlog of good unoperated acreage in order to replenish the reserves from which gas is being constantly withdrawn.

The Company's unoperated acreage holdings are constantly undergoing a sifting process. As drilling operations are carried on and certain areas are condemned by dry holes drilled by the Company or others, acreage held in such areas is surrendered. On the other hand, the same drilling programs may indicate that other areas are prospective and more acreage is then acquired. The History of the Company over the past fifty years indicates that it is necessary to handle about 6 acres of unoperated territory in order to eventually develop one acre of proven productive territory. This ratio would be much higher if the unoperated acreage holdings were not constantly undergoing a sifting process.

It has been the policy of the Company to watch all drilling operations taking place in its territory and to study the results obtained, both from the standpoint of production obtained and from Geological information available. If the results indicate that an area is favorable, an intensive effort is made to obtain new acreage. If the results are unfavorable, any acreage which the Company holds in the region is surrendered.

In a region like Southwestern Pennsylvania where there are a number of producing sands at depths ranging from a few hundred feet to 7,000 feet, it is not uncommon for a territory to have been drilled to certain shallow

depth and apparently condemned, only to be later proven in deeper sands by subsequent drilling.

The various cycles of deeper drilling have been discussed in the Historical report and the graph on page 124 indicates the progress of deeper drilling through the years. Because of the change in status of prospectiveness, large areas have been surrendered and later re-acquired. A typical example of this condition is the present day trend of acquiring acreage which is located well structurally, i.e. on well defined anticlines. The prospect of finding new reserves in the deeper Onondaga Limestone and Oriskany sandstone, which formations are productive only in regions where good geological structure is present, is responsible for this trend. In many areas, the shallow sands were tested in regions of good structure, and were not productive. These areas are now attractive and are being leased. In numerous places, the shallow sands were productive on these structures, but the supply of gas in the upper sands has been depleted. Areas of this type are now considered attractive for the possible deep reserves and are being acquired.

Unoperated acreage has been developed continuously from the beginning of the Company's history. The amount of development has been in direct proportion to the amount of gas withdrawn, as is to be expected. It is necessary to replenish the reserves as they are withdrawn, or the supply would soon be inadequate to meet the requirements of the consumers.

In order to supply the needs of the consumers, it is necessary to have available enough gas to meet the requirements on days of the greatest demand, i.e., days of "peak load". It is not uncommon for "peak day" demands to be two or three times as large as average requirements; consequently a gas Company must develop reserves with a daily supply greatly in excess of its

average daily requirements.

The Peoples Natural Gas Company has endeavored to have an adequate supply of prospective unoperated acreage at all times since the beginning of its history. In order to maintain its markets, it has been necessary to obtain acreage and maintain operations in most of the gas fields of southwestern Pennsylvania. Since development has been continuous from 1885 to the present, it has been necessary to have large holdings of acreage throughout the territory in which it operates.

The reader is referred to the map on page 23 which shows the developments by periods from 1886 to 1936, inclusive. The areas indicated in green show the territory developed in each period. It is obvious that the Company was able to bring about the developments only because it had unoperated acreage in these areas prior to the period when the development actually took place. It is often necessary to obtain the acreage a number of years prior to the time when it is developed in order to be able to hold it in reserve until the time when it is needed to supply the Company's markets. The acreage must be acquired when it is available and carried by means of delay rentals until such time as it is needed. It will be noted from the maps, that extensive areas were developed in Armstrong, Westmoreland, Allegheny and Greene Counties during the period ending in 1904. It was, therefore, necessary to have unoperated acreage in all of these areas prior to the time when it was developed. A glance at the map for the period ending in 1909 will indicate extensive developments in Clarion, Armstrong, Westmoreland, Washington and Greene Counties during this period. In order to be prepared for these developments, the Company had

acquired as unoperated acreage, extensive holdings in all of these areas. Much of this acreage had been acquired many years prior to its development, in order that it could be held in reserve for the time when operated areas were no longer capable of maintaining a sufficient supply for the consumers who required the gas during the period ending in 1907 and henceforth.

Reference to the Map will indicate that similar developments over a wide area characterizes each period of the Company's history, and will, of course, continue in the future.

The Company has been able to continue its uninterrupted service to its consumers only as a result of its ability to develop new supplies of gas from the unoperated acreage held in reserve. As has been explained in other parts of this report, the Company must constantly study the geological conditions revealed by drilling in order to sift out the less prospective of the unoperated acreage and be constantly on the lookout for new prospective acreage as it becomes available. This vigilance results in a constantly changing holding of unoperated acreage. The extent of this sifting can best be determined from a study of the appended table on page 149, in which the amount of the different classifications of acreage is listed by years.

Unoperated Acreage - The amount required and the use of, during the Company's History:

Unoperated acreage is required by a gas company to furnish additional supplies of gas when presently operated areas are no longer capable of supplying sufficient gas. Since presently operated acreage is depleted in direct ratio to the yearly withdrawal, it necessarily follows that the unoperated acreage required to replenish the reserves depleted is also directly proportional to the yearly withdrawals.

The amount of withdrawal per year determines the amount of operated acreage required per year, and it, therefore, follows that if the amount of operated acreage carried in any one year is divided by the number of Billion cubic feet of gas withdrawn for that year, the result would indicate the amount of operated acreage required per year, per billion cubic feet of gas produced.

The Peoples Natural Gas Company has reasonably accurate data on acreage and production back to the year 1904. This data will be found in the table on Page 150. The amount of operated acreage required per year has been calculated, and is plotted on Chart 14, Page 145. It can be seen from the graph that this data indicates a constantly increasing amount of operated acreage required per billion withdrawn. This is to be expected as the entire Western Pennsylvania Gas Field has been quite well explored, and each year, the average new well drilled has less reserve than those drilled in preceding years; also the previously operated acreage becomes less productive each year. By drawing an average curve through these points, it will be noted that in 1904, it required only about 2,800 acres of operated leaseholds per billion of withdrawal, and this had risen to about 18,000 acres by 1936. It can be seen from Chart 14, that there have been a few years in the Company's history when it has had more operated acreage per billion of withdrawals than would have been essential. This is noticeable in 1925, and to a greater degree in 1932, 1933 and 1934. It is of interest to note that in each of these years, business conditions were bad, and the Company suffered a considerable loss in market, and the development which had been necessary to maintain loads when the markets were better, was consequently more than adequate for the periods when production requirements were greatly reduced.

As stated above, operated acreage becomes depleted in direct ratio to the rate of withdrawal and also is affected by the age of the properties. It is, therefore, possible to determine the rate of complete depletion per billion feet of gas produced per year by dividing the total amount of operated acreage surrendered per year by the number of billion cubic feet of gas withdrawn per year, the result being the number of acres completely depleted per billion per year. The amount of operated acreage surrendered per year is shown on Page 148. A table showing the result of these calculations is shown on Page 150. This data has been plotted on Chart 15, Page 146. It will be noted that the "complete depletion" rate has been increasing steadily since 1904, when the data first becomes available in the Company's records. It was less than forty acres per billion produced in 1904, and it has risen steadily until by 1936, it is almost 400 acres per billion produced.

From the above data, it can be seen that there is a definitely established trend of the amount of acreage which must be proven up and operated each year, and that it bears a direct ratio to the amount of gas withdrawn when the time element or age of the producing properties is considered. It is quite obvious from the curves, that the amount of operated acreage required per billion produced is constantly increasing and that this necessitates the development of unoperated acreage on a constantly increasing basis in order to maintain the supply.

Since only a fraction of the unoperated acreage explored becomes proven and operated, a study of the Company's past history was made to ascertain how much acreage had to be explored per year to develop one operated acre. Unoperated acreage is acquired and carried by means of delay

rentals until it has been sufficiently explored to be proven and operated in the event it is productive, or until it has been condemned, in which event, it is surrendered. It may, therefore, be said that the amount of acreage explored in any one year of the Company's history, equals the amount of acreage proven and transferred to operated, plus the amount of acreage surrendered.

Data on the amount of acreage explored, and the results as to the amount proven and the amount surrendered by years, is contained in the Table on Page 151. It can be seen that if the total amount of acreage explored (acreage proven plus acreage surrendered) is divided by the amount of acreage proven, the result will equal the number of unoperated acres required to be explored in order to develop one acre of proven and operated territory. This data was studied from the Company's history since 1904, and the result plotted on Page 147. It is evident from the curve, that there was no regular well defined trend in the amount of "unoperated acreage explored per acre proven" until about 1914. This can be readily understood, from the Historical data on the Company's operations contained in other parts of this report, when it is considered that up until 1914, new flush fields were a common occurrence, and the rate of exploration was high with consequent irregularities in the amount of acreage turnover. The amount of development until about that time was insufficient to determine the status of unoperated acreage as well as it could be done in more recent years, and consequently there were large holdings which had not been as well sifted as in later years.

The curve indicates that after 1914, there is a rather definite trend in the ratio of unoperated acreage explored per year to the amount

proven productive, and by drawing an average curve through the points plotted, it is seen that this is slowly rising, having changed from about 2½ acres "explored unoperated per acre proven" in 1915 to slightly higher than five acres in 1930, the last year when average exploratory operations were being carried out by the Company. The data for the years 1931 to 1938 is not plotted, as so little drilling took place by the Company during these years, that the results would be too high and are obviously abnormal. By extending the curve, the trend of which is well substantiated by the fifteen years period considered, it may be seen that had normal drilling conditions prevailed in 1938, approximately seven acres would have been explored to every acre proven.

Justification For, and Probable use of Unoperated Acreage Held by The Company as of January 1, 1938

The past use of unoperated acreage, and its relation to withdrawals has been explained above. It may be seen from this data that knowing the anticipated withdrawals for any one year, the amount of unoperated acreage required may be determined for that year. Since the curves on which this data for the past have been plotted show a pronounced regularity in trend for a number of years, it is fair to assume that this trend will be continued in the future, and by using the curves, the amount of unoperated acreage required for future years may be anticipated, provided an estimate of the amount of withdrawals is known.

To obtain an estimate of the withdrawals in future years, the production for the Company has been plotted on Chart 5, Page 119. It will be noted that the production for The Peoples Natural Gas Company only is shown

until 1926, after which time, the production for the Columbia Natural Gas Company is shown, since both of these Companies were merged as of January 1, 1939, and both will contribute production in the future. The trend established by these curves has been extended, and allowance made for future additional demands such as the need for more production when sources such as the New York State Natural Gas Corporation and other large purchases are not available.

From this curve, the future requirements from production for the Company have been estimated, and this data is shown in Column 1 of the table on Page 152. It will be noted that the estimated amount of withdrawals for 1939 is 4,800,000 M. cubic feet. If Chart 14, Page 145 is consulted, it will be found that during 1939, 19,000 acres of operated leaseholds will be required per billion feet of gas withdrawn, and since it is anticipated that 4.8 billion will be withdrawn, the Company will need 91,200 acres of operated leaseholds to be able to supply the required amount of gas. From Chart 15 Page 146, it will be seen that 410 acres of operated leaseholds will be abandoned per billion produced in 1939, and this in turn indicates that a total of 1,970 acres will be surrendered because of depletion as a result of the total production for the year. However, the total operated acreage held by The Peoples Natural Gas Company was 138,015 acres, which is in excess of the amount required to be operated in order to meet the demands for 1939, and it would, therefore, not be essential that the Company develop acreage during 1939.

The withdrawals because of production for the year 1940 have been estimated as 6.4 billion cubic feet as extrapolated from the Curve "A", Chart 5, Page 119. By working out the unoperated acreage requirements for the Company in 1940 in the same fashion as indicated above for 1939, it is apparent that the Company would not be forced to develop any additional oper-

ated acreage in this year, as the present acreage, less the estimated amount to be abandoned, will be adequate to supply the required gas until the end of 1940.

The estimated withdrawals for the year 1941 are 7.7 Billion as taken from the projection of the Curve "A". From Chart 14, Page 145, the acreage required per billion of withdrawals is found to be 19,600 acres, indicating a total operated acreage requirement to meet the demands from withdrawals of 150,500 acres. Since the Company will have only 134,355 acres of operated leaseholds at the beginning of 1941, it is apparent that 16,145 acres of proven and operated territory will have to be developed. There will also be an estimated 3,310 acres of the operated territory at the beginning of 1941, surrendered as a result of complete depletion (from Chart 15 times the estimated withdrawals). This acreage will have to be replaced by new proven and operated territory; hence a total of 19,455 acres will have to be proven and operated in addition to the amount already developed at the beginning of the year. This new operated territory will be developed from the unoperated leaseholds which have been retained by the Company through the payment of delay rentals. From Chart 16, Page 147, it may be seen that in the year 1940, it will be necessary to explore 7.2 acres of unoperated leaseholds for every proven and operated acre resulting. Consequently a total of 19,455 acres times 7.2 or 140,000 unoperated acres will be used by the Company to supply its markets in 1941.

In like manner, it has been estimated that the Company will need to explore 165,900 acres of unoperated leaseholds in 1942; 61,400 acres in 1943; 48,700 acres in 1944 and 51,900 acres in 1945. Therefore, a total of 407,900 acres of unoperated leases will be essential to supply the Company's needs during the next seven years.

As of January 1, 1939, the combined unoperated acreage holdings of the Company, including The Peoples Natural Gas Company and the Columbia Natural Gas Company were 498,588 acres. From the above data, it can be seen that this acreage holding is essential to insure the Company a source of supply to meet its requirements for a period of seven years, and it is obvious that the Company's investment must be protected for not less than this length of time.

A self-explanatory table showing the steps by which the number of unoperated acres required per year was determined, will be found on page 152.

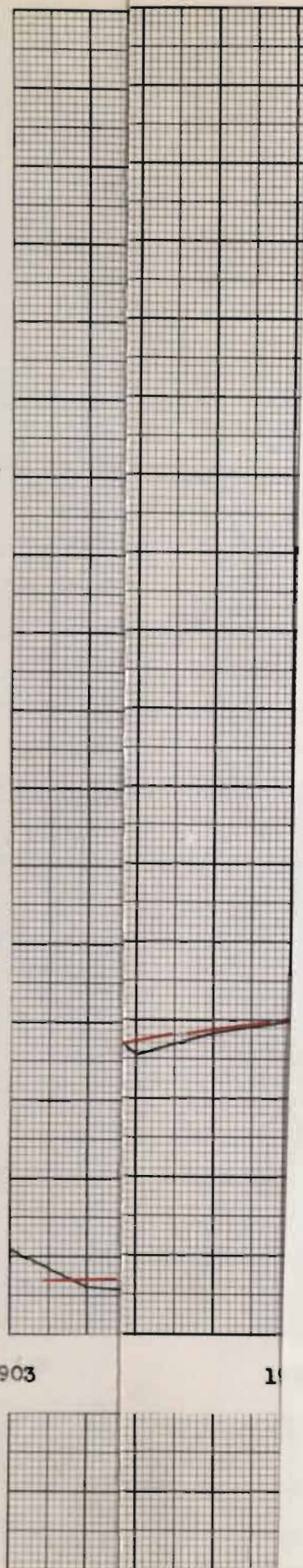
Chart 14

NUMBER OF OPERATED ACRES PER BILLION CU. FT. OF GAS PRODUCED

40,000
36,000
32,000
28,000
24,000
20,000
16,000
12,000
8,000
4,000
0

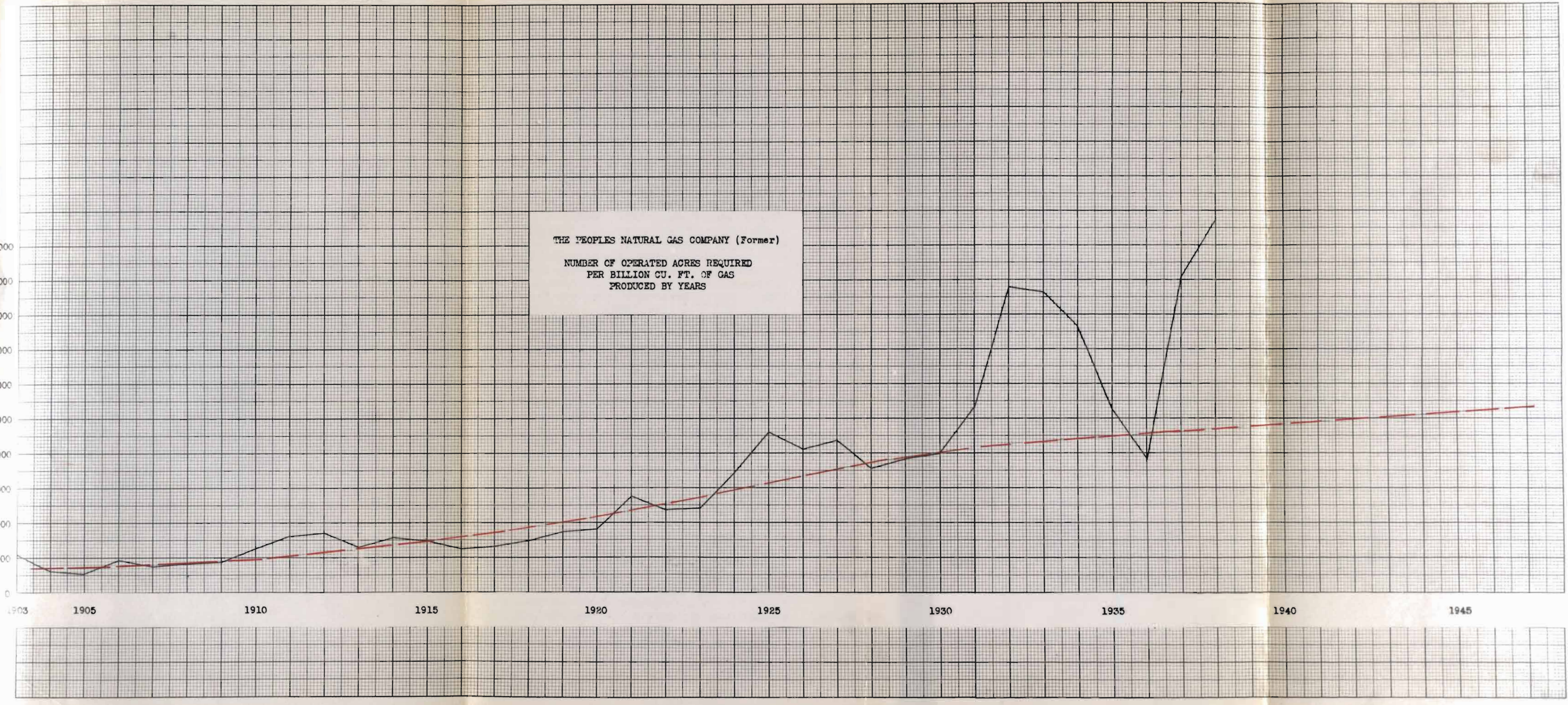
1903

19



NUMBER OF OPERATED ACRES PER BILLION CU. FT. OF GAS PRODUCED

THE PEOPLES NATURAL GAS COMPANY (Former)
NUMBER OF OPERATED ACRES REQUIRED
PER BILLION CU. FT. OF GAS
PRODUCED BY YEARS



THE PEOPLES NATURAL GAS COMPANY (Former)
 NUMBER OF ACRES COMPLETELY DEPLETED
 PER BILLION CU. FT. OF GAS
 PRODUCED BY YEARS

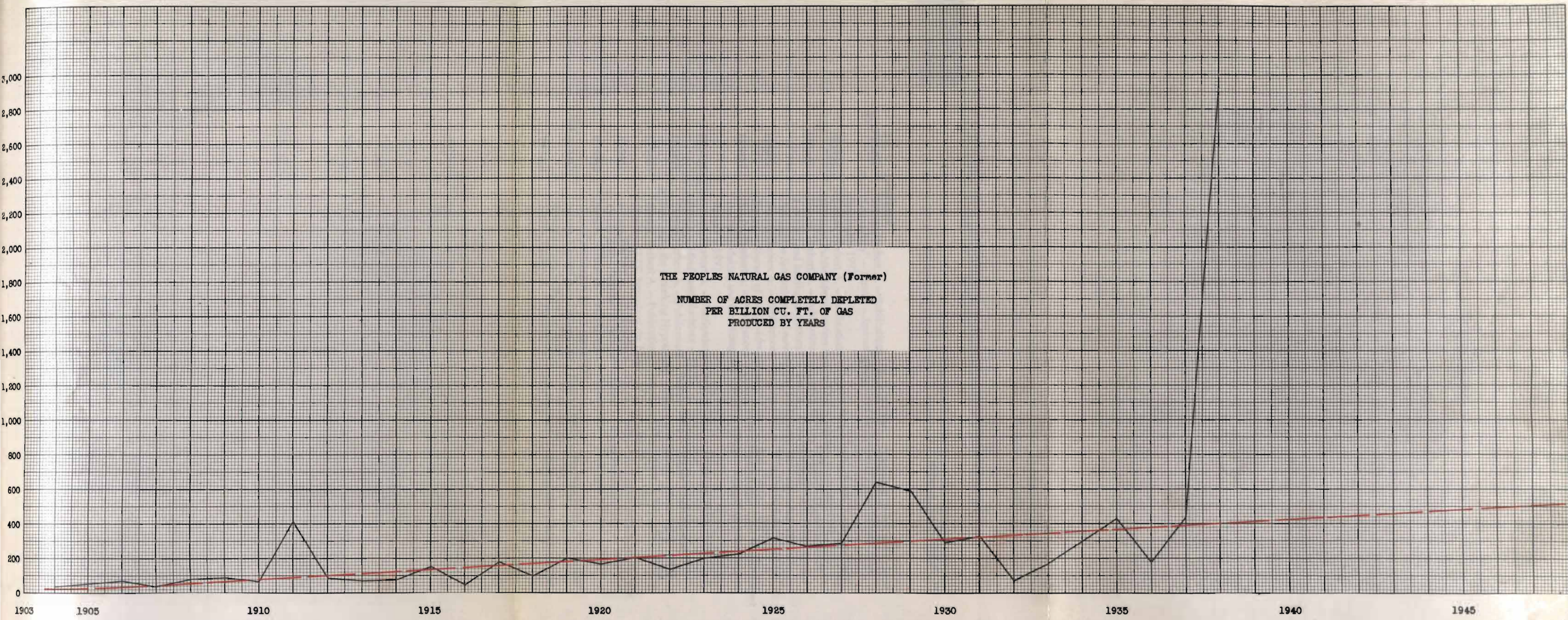


Chart 16

ACRES EXPLORED PER ACRE PROVEN

PANY (1
VEN BY
Trend

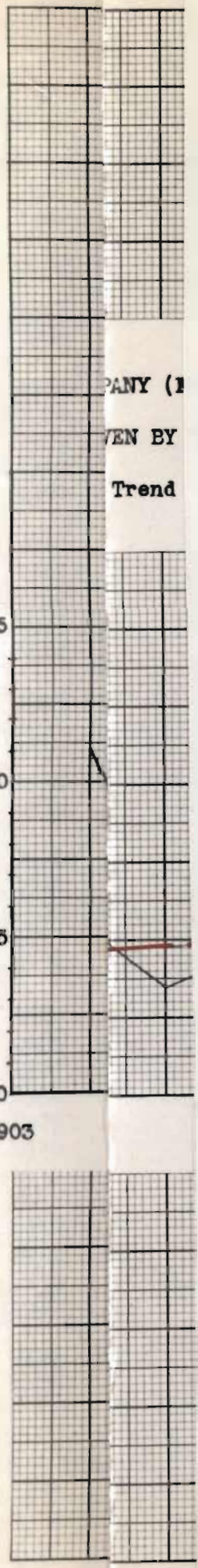
15

10

5

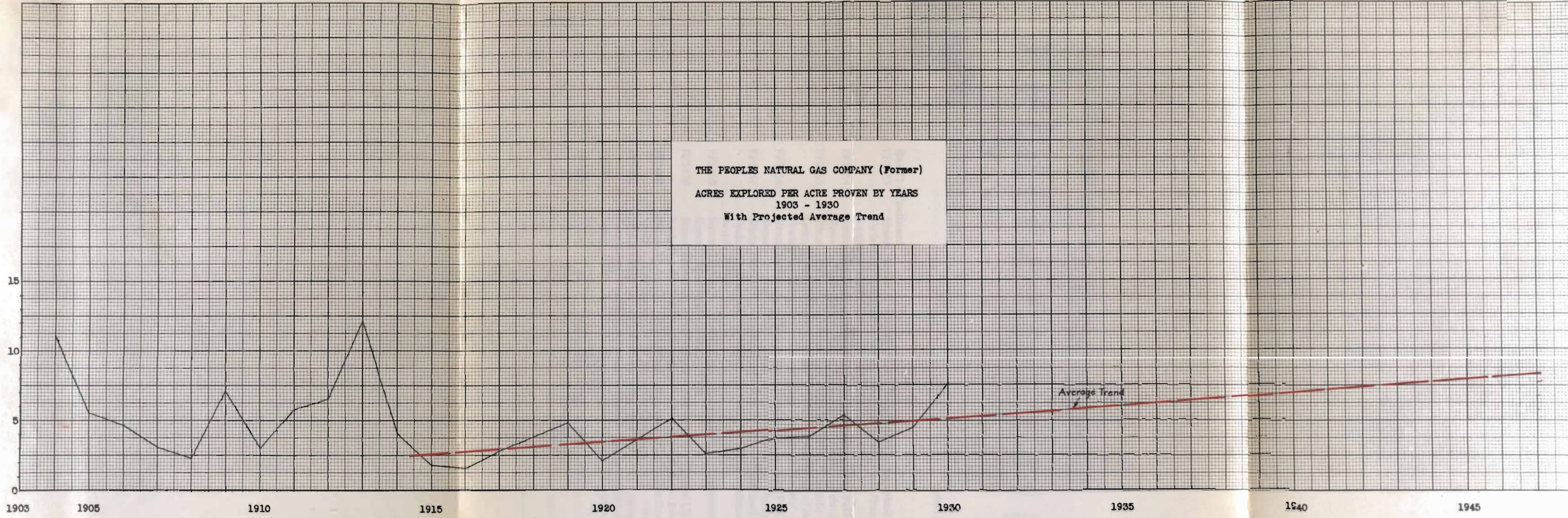
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1903



ACRES EXPLORED PER ACRE PROVEN

THE PEOPLES NATURAL GAS COMPANY (Former)
ACRES EXPLORED PER ACRE PROVEN BY YEARS
1903 - 1930
With Projected Average Trend



THE PEOPLES NATURAL GAS COMPANY

TABLE NO. 6

TABLE SHOWING ANALYSIS OF OPERATED ACREAGE 1904 - 1938, INCLUSIVE

Year	Acreage Balance At Beginning Of Year	Acres Acquired Account of Replaced	Acres Acquired Account of New	Acres Trans- ferred From Unoperated	Acres Cancelled Account of Surrendered	Acres Cancelled Account of Replaced	Acres Trans- ferred back To Unoperated	Acreage Balance at End of Year
1903			23,855.71					23,855.71
1904	23,855.71	264.50	1,846.50	2,751.00	391.00	208.00	-	28,118.71
1905	28,118.71	133.00	294.00	2,316.09	629.00	189.50	-	30,043.30
1906	30,043.30	-	307.00	2,397.50	539.00	-	-	32,208.80
1907	32,208.80	-	76.00	3,440.50	382.00	-	-	35,343.30
1908	35,343.30	-	8,411.75	2,618.00	1,012.00	-	-	45,361.05
1909	45,361.05	-	-	1,472.00	1,058.00	208.00	-	45,567.05
1910	45,567.05	-	125.00	3,417.85	535.00	-	-	48,574.90
1911	48,574.90	3.79	471.00	1,985.50	2,912.85	3.79	-	48,118.55
1912	48,118.55	100.00	3,154.16	2,644.00	571.00	100.00	-	53,345.71
1913	53,345.71	100.00	1.00	4,272.11	586.33	112.00	110.00	56,910.49
1914	56,910.49	-	330.00	2,041.00	646.17	90.00	-	58,545.32
1915	58,545.32	154.00	266.00	2,676.50	1,441.00	440.00	-	59,760.82
1916	59,760.82	-	302.00	7,358.00	510.00	450.00	-	66,460.82
1917	66,460.82	-	941.33	9,765.50	2,377.50	-	-	74,790.15
1918	74,790.15	-	95.00	8,798.50	1,245.00	50.00	-	82,298.65
1919	82,298.65	-	147.50	5,747.00	2,352.00	-	-	85,841.15
1920	85,841.15	-	2,760.50	2,769.00	1,976.72	-	-	89,393.93
1921	89,393.93	70.00	-	4,415.00	1,666.00	-	-	92,212.93
1922	92,212.93	258.00	355.00	2,721.00	1,276.00	120.00	-	94,150.93
1923	94,150.93	-	-	4,692.00	1,906.00	104.00	-	96,832.93
1924	96,832.93	-	-	4,123.00	1,583.00	-	-	99,372.93
1925	99,372.93	-	208.00	2,582.00	1,675.00	103.00	-	100,384.93
1926	100,384.93	-	-	2,949.00	1,609.50	175.00	-	101,549.43
1927	101,549.43	-	4.00	2,229.00	1,630.58	-	-	102,151.85
1928	102,151.85	-	367.00	2,386.00	1,769.00	128.00	2,754.50	100,253.35
1929	100,253.35	-	-	1,936.00	3,682.00	-	76.00	98,431.35
1930	98,431.35	-	44.00	2,552.00	1,644.00	50.00	133.00	99,200.35
1931	99,200.35	3.24	44.00	314.00	1,400.96	464.00	70.00	97,626.63
1932	97,626.63	-	1.00	-	173.00	-	-	97,454.63
1933	97,454.63	-	-	-	467.00#	-	-	97,118.63
1934	97,118.63	-	-	82.00	837.00#	-	-	96,199.63
1935	96,199.63	-	-	-	1,372.00#	-	542.95	94,284.68
1936	94,284.68	-	-	-	1,450.00#	-	-	92,834.68
1937	92,834.68	-	-	-	-	-	-	91,995.68
1938	91,995.68	-	-	-	-	-	-	85,511.68

- Estimated Figures

THE PEOPLES NATURAL GAS COMPANY

TABLE SHOWING ANALYSIS OF UNOPERATED ACREAGE 1904 - 1938, INCLUSIVE

Table 7

Year	Acreage Balance At Beginning of Year	Acres Acquired Account of Replaced	Acres Acquired Account of New	Acres Trans- ferred to Operated	Acres Cancelled Account of Surrendered	Acres Cancelled Account of Replaced	Acres Trans- ferred Back From Operated	Acreage Balance at End of Year
1903	-	-	93,021.02	-	-	-	-	93,021.02
1904	93,021.02	4,797.06	8,529.50	2,751.00	27,689.15	3,045.43	-	72,862.00
1905	72,862.00	1,767.75	2,801.40	2,316.09	10,620.00	3,663.75	-	60,831.31
1906	60,831.31	2,212.09	16,202.33	2,397.50	8,807.00	2,175.09	-	65,866.14
1907	65,866.14	2,763.00	17,550.81	3,440.50	7,186.50	2,594.00	-	72,958.95
1908	72,958.95	4,457.00	15,090.00	2,618.00	3,248.12	4,683.63	-	82,046.20
1909	82,046.20	9,953.00	30,408.26	1,472.00	9,030.00	9,253.00	-	102,652.46
1910	102,652.46	1,075.00	45,239.73	3,417.85	6,619.50	1,498.00	-	137,431.84
1911	137,431.84	4,121.50	35,952.50	1,985.50	9,538.21	3,704.50	-	162,277.63
1912	162,277.63	8,957.00	72,971.39	2,644.00	14,715.25	8,999.50	-	217,847.27
1913	217,847.27	7,067.00	31,449.82	4,272.11	47,694.00	6,822.50	110.00	197,685.48
1914	197,685.48	19,714.50	15,713.67	2,041.00	6,292.72	19,557.50	-	205,222.43
1915	205,222.43	16,545.22	24,799.10	2,676.50	2,056.00	14,609.90	-	227,224.35
1916	227,224.35	18,828.00	91,376.50	7,358.00	3,781.82	15,455.50	-	310,833.53
1917	310,833.53	22,042.50	34,678.50	9,765.50	17,616.25	21,562.00	-	318,610.78
1918	318,610.78	26,472.25	22,953.87	8,708.50	24,138.50	24,655.25	-	310,534.65
1919	310,534.65	23,845.67	24,982.34	5,747.00	21,829.01	29,243.67	-	302,542.98
1920	302,542.98	16,261.00	14,978.25	2,769.00	55,826.75	16,205.00	-	258,981.48
1921	258,981.48	49,414.25	10,090.26	4,415.00	11,550.00	35,186.50	-	267,334.49
1922	267,334.49	26,489.00	14,936.00	2,721.00	11,208.50	35,047.25	-	259,782.74
1923	259,782.74	25,372.50	8,242.00	4,692.00	7,497.50	24,034.62	-	257,173.12
1924	257,173.12	19,921.00	1,952.00	4,123.00	8,192.00	21,759.00	-	244,972.12
1925	244,972.12	22,262.00	4,803.00	2,582.00	7,242.00	22,192.00	-	240,021.12
1926	240,021.12	37,417.00	2,518.00	2,949.00	8,281.00	32,970.59	-	235,755.53
1927	235,755.53	24,967.00	3,669.00	2,229.00	9,794.50	30,032.00	-	222,336.03
1928	222,336.03	17,265.50	3,599.00	2,386.00	5,526.50	16,105.50	2,754.50	221,937.03
1929	221,937.03	27,264.00	39,342.00	1,936.00	6,830.00	33,686.00	76.00	246,167.03
1930	246,167.03	17,038.00	49,183.00	2,552.00	16,910.00	17,622.00	133.00	275,437.03
1931	275,437.03	52,678.00	25,330.00	314.00	13,969.82	52,257.00	70.00	286,974.21
1932	286,974.21	41,184.00	16,330.00	-	4,211.00	41,178.00	-	299,099.21
1933	299,099.21	49,490.00#	5,472.00#	-	42,557.00#	49,490.00#	-	261,989.21
1934	261,989.21	24,013.00#	10,931.00#	82.00	13,181.00#	24,013.00#	-	259,821.21
1935	259,821.21	21,106.00#	28,857.00#	-	11,286.00#	21,106.00#	542.95	277,935.16
1936	277,935.16	10,021.00#	30,951.00#	-	10,951.00#	10,021.00#	-	297,935.16
1937	297,935.16	-	-	-	-	-	-	321,235.16
1938	321,235.16	-	-	-	-	-	-	350,894.16

#- Estimated Figures

Table 8

THE PEOPLES NATURAL GAS COMPANY

TABLE SHOWING YEARLY PRODUCTION, OPERATED ACREAGE
AND
ACREAGE SURRENDERED AND TRANSFERRED TO UNOPERATED

YEAR	PRODUCTION BILLIONS OF CUBIC FEET	OPERATED AC- REAGE AS OF END OF YEAR	OPR. ACRO.SUHR. OR TRANS. TO UNOPR. DUR. YR.	AMT.OF OPR. ACREAGE PER BIL.WITHDRAWN	OPR.ACRO.SUHR. OR TRANS.TO UN- OPR. PER BIL.WITHDRA
1903	5.56	23,855.71	-	4,290	-
1904	12.59	28,118.71	391.00	2,425	31.05
1905	13.98	30,043.30	629.00	2,147	45.00
1906	8.53	32,208.80	539.00	3,775	63.20
1907	11.76	35,343.30	382.00	3,005	32.48
1908	13.42	45,361.05	1,012.00	3,380	75.45
1909	13.22	45,567.05	1,058.00	3,446	80.05
1910	9.57	48,574.90	535.00	5,080	55.95
1911	7.41	48,118.55	2,912.85	6,490	404.00
1912	7.80	53,345.71	571.00	6,830	73.20
1913	10.96	56,910.49	696.33	5,195	63.50
1914	9.38	58,545.32	646.17	6,245	68.90
1915	10.10	59,760.82	1,441.00	5,920	142.70
1916	13.15	66,460.82	510.00	5,050	38.75
1917	14.04	74,790.15	2,377.50	5,320	169.20
1918	13.85	82,298.65	1,245.00	5,940	89.90
1919	12.22	85,841.15	2,352.00	7,025	192.20
1920	12.29	89,393.93	1,976.72	7,270	160.70
1921	8.35	92,212.93	1,666.00	11,050	199.40
1922	9.91	94,150.93	1,276.00	9,500	128.90
1923	9.98	96,832.93	1,906.00	9,700	191.00
1924	7.23	99,372.93	1,583.00	13,750	219.20
1925	5.45	100,384.93	1,675.00	18,430	307.20
1926	6.15	101,549.43	1,609.50	16,500	261.80
1927	5.86	102,151.85	1,630.58	17,420	279.50
1928	7.07	100,253.35	4,523.50	14,190	640.00
1929	6.45	98,431.35	3,758.00	15,260	582.50
1930	6.26	99,200.35	1,777.00	15,850	284.00
1931	4.57	97,626.63	1,470.96	21,370	321.50
1932	2.78	97,454.63	173.00	35,050	62.20
1933	2.81	96,937.63	467.00	34,500	166.20
1934	3.15	96,182.63	837.00	30,550	265.50
1935	4.49	94,267.68	1,914.95	21,000	426.00
1936	6.05	92,817.68	1,450.00	15,340	240.00

Note: - Some of the above data subject to slight correction.

Table 9

THE PEOPLES NATURAL GAS COMPANYTABLE SHOWING ACREAGE EXPLORED PER YEAR*

YEAR	(A) ACREAGE PROVEN & OPERATED DURING THE YEAR	(B) ACREAGE SURR- ENDERED DUR- ING THE YEAR	(C) ACREAGE EX- PLORED PER YEAR (A B)	(D) NO. OF ACRES EX- PLORED PER ACRE PROVEN & OPERATED
1903	-	-	-	-
1904	2,751.00	27,689.15	30,440.15	11.09
1905	2,316.09	10,620.00	12,936.09	5.59
1906	2,397.50	8,807.00	11,204.50	4.67
1907	3,440.50	7,186.50	10,627.00	3.09
1908	2,618.00	3,284.12	5,902.12	2.26
1909	1,472.00	9,030.00	10,502.00	7.14
1910	3,477.85	6,619.50	10,037.35	2.94
1911	1,985.50	9,538.21	11,523.71	5.80
1912	2,644.00	14,715.25	17,359.25	6.56
1913	4,272.11	47,694.00	51,966.11	12.15
1914	2,041.00	6,292.72	8,333.72	4.08
1915	2,676.50	2,056.00	4,732.50	1.77
1916	7,358.00	3,781.82	11,139.82	1.52
1917	9,765.50	17,616.25	27,381.75	2.80
1918	8,708.50	24,138.50	32,847.00	3.78
1919	5,747.00	21,829.01	27,576.01	4.80
1920	2,769.00	55,826.75	58,595.75	2.12
1921	4,415.00	11,550.00	15,965.00	3.61
1922	2,721.00	11,208.50	13,929.50	5.12
1923	4,692.00	7,497.50	12,189.50	2.60
1924	4,123.00	8,192.00	12,315.00	2.99
1925	2,582.00	7,242.00	9,824.00	3.80
1926	2,949.00	8,281.00	11,230.00	3.81
1927	2,229.00	9,794.50	12,023.50	5.39
1928	2,386.00	5,526.50	7,912.50	3.46
1929	1,936.00	6,830.00	8,766.00	4.53
1930	2,552.00	16,910.00	19,462.00	7.63
1931	314.00	13,969.82	14,283.82	45.45
1932	0.00	4,211.00	4,211.00	∞
1933	0.00	42,557.00	42,557.00	∞
1934	82.00	13,181.00	13,263.00	161.74
1935	0.00	11,286.00	11,286.00	∞
1936	0.00	10,951.00	10,951.00	∞

Note: Some of the above data subject to slight correction.

* - Acreage Surrendered Plus Acreage Proven & Operated _ Acreage explored Per Year.

TABLE SHOWING AMOUNT OF UNOPERATED ACREAGE REQUIRED
PER YEAR IN THE FUTURE AND THE DATA USED TO DETERMINE SAME

** - Operated Acreage as of December 31, 1939, less the Amount to be Abandoned (Column 6)

FORECAST OF MARKET REQUIREMENTS AND SOURCE OF SUPPLY
WITH AN ANALYSIS OF THE DRILLING PROGRAM NECESSARY
AND THE ESTIMATED COST OF THE PROGRAM

FORECAST OF MARKET REQUIREMENTS AND SOURCE OF SUPPLY
WITH AN ANALYSIS OF THE DRILLING PROGRAM NECESSARY
AND THE ESTIMATED COST OF THE PROGRAM

In order to estimate future market requirements and source of supply for The Peoples Natural Gas Company, it is necessary to have a knowledge of the requirements and source of supply in the past.

Market requirements have been divided into three classes - (1) Domestic and Commercial Sales; (2) Industrial Sales; and (3) Other Sales, which includes gas sold to Churches and Charitable institutions, gas sold to non-affiliated companies, gas used in Company operations, etc. These are shown in Table 11 on Page 174, and have been plotted cumulatively on the graph shown on Page 168 from 1908 to 1926 when the Columbia Natural Gas Company was added. From this point until the end of 1938 the requirements for both Companies have been plotted, keeping the type of market for both Companies together, and dividing each type of market into two parts by a dotted line to show the relative amounts of gas sold by each Company. It will be noted that these graphs are cumulative, and the amount shown between the lines is the amount for the market named therein. Thus, the top line on the graph indicates total market requirements.

For the purpose of estimating future market requirements, trends have been established by using the solid lines dividing the three types of markets, and these trends have been extended to the year 1945. No trends have been established along the dotted lines because of the fact that the two Companies were merged as of January 1, 1939, therefore, it is not necessary to divide the markets by Companies from that time on. It will be noted that these trends do not extend back beyond 1926, since it was thought advisable to use only that part of the graph in which both Companies appear. The

results obtained by the trends or the estimated future market requirements to 1945 are shown in Table 13, Page 176.

Table 12 on Page 175 shows the source of supply for The Peoples Natural Gas Company and, after 1926, the Columbia Natural Gas Company. The source of supply has been plotted cumulatively on the graph shown on Page 119, and divides the source into several parts. From 1903 to 1926, the table and graph show the amount of gas produced and purchased by The Peoples Natural Gas Company, the purchased gas being divided into that purchased from the Hope Natural Gas Company, and that purchased from other sources, chiefly small independent operators in the Pittsburgh district. After 1926, the Columbia Natural Gas Company has been added, and its source of supply divided into two parts, gas produced and gas purchased. These have been placed on the graph in such a way that the same types of source for both Companies fall together, and are divided by Companies by a dotted line. In 1936, The Peoples Natural Gas Company began to purchase some gas from the New York State Natural Gas Corporation, and this is shown in the table and on the graph as a separate item. As in the graph of Market Requirements, all items on the graph showing source of supply are shown cumulatively, the amount of gas shown between two curves representing the amount obtained from the source named therein.

In order to estimate future sources of supply, trends have been established along the solid lines showing the various sources of supply, and these trends have been extended, with some modification based on expected future conditions as will be explained, to the year 1945. These trends do not appear before 1926, since it was thought advisable to use only that part of the graph in which both Companies appear. No trends have been established along the dotted lines dividing the two Companies, since the

Companies have been merged as of January 1, 1939, and it will not be necessary to distinguish between them from this time on. It will be noted that the source of supply designated as "Gas Purchased by The Peoples Natural Gas Company from the New York State Natural Gas Corporation" is extended only to and including 1940, with a small amount of gas being allowed in that year. This is due to the fact that the reserves of the New York State Natural Gas Corporation are being depleted very rapidly, and gas will not be available for purchase from this source beyond 1940, unless extensive additional reserves can be developed which at this time seems highly improbable. The loss of this source of supply will necessitate increasing the amount of production by The Peoples Natural Gas Company, or increasing the amount of gas purchased from the Hope Natural Gas Company, or both. In all probability, an increase in both of these sources is most likely, and has been so shown on the graph. It is also probable that gas available for purchase from other sources, i. e., independent operators, etc., will decline gradually from year to year, thus making it necessary to further increase production and purchase from Hope Natural Gas Company. The Curve showing estimated future production has been designated as Graph "A", since it will be used in a further study of production. The results obtained by the extension of the trends on this graph, or the estimated future source of supply to 1945, are shown in Table 14, Page 176.

Production

Referring to Graph "A" noted in the foregoing discussion of Source of Supply, it will be seen that the production which has been estimated for The Peoples Natural Gas Company increases from 4.8 Billion cubic feet in 1939 to 8.2 Billion cubic feet in 1943, 1944 and 1945. It is now necessary to determine the conditions which will enable the Company to produce the

required amount of gas. The amount of gas which it is possible to produce is a direct function of the number of wells available, and for this reason, Table 15, Page 177, shows the number of wells available by years, and also the production by years. By dividing, it is possible to obtain the number of wells available per billion cubic feet of gas produced, and this figure is plotted by years on Chart No. 18, Page 169. A trend through the lower points of this curve has been extended to the year 1945 and, from this trend, the number of wells necessary to produce one billion cubic feet of gas has been taken. The reason for drawing this trend through the lower points of the graph is quite obvious since the high points represent a much larger number of wells than is necessary to furnish the required amount of gas. The fact that the graph drops again in subsequent years proves this point. However, it is believed that the lower points represent the minimum number of wells which can safely be assumed as being adequate. For this and following graphs, no data is as yet available for the Columbia Natural Gas Company, but it is believed the results obtained would be very similar, since the territories operated by both Companies are similar.

Chart No. 19, Page 170, which has been plotted from Table 16, Page 178, shows the number of wells which were drilled deeper and found productive in deeper sands, per billion cubic feet of gas produced by years. A trend has been established through this curve, and extended to 1945. This graph represents the number of wells which must be drilled deeper to maintain production from the old wells. If old wells were not being drilled deeper continuously, many more new wells would be required. Table 1, Page 128, and Charts Nos. 11 and 12, Pages 125 and 126 from the Historical Report, show the relationship existing between reserve developed by new producing wells and productive drilling deeper operations on old

wells. It can be readily seen that two wells drilled deeper are approximately equivalent to one new well. This fact is made use of a little later to reduce the number of new wells which it is estimated the Company will be required to drill in order to meet production demands.

Table 17, Page 179, also shows the number of wells abandoned and sold each year, and by dividing by the amount of gas produced in billion cubic feet, the number of wells abandoned and sold per billion cubic feet produced is obtained. This figure is plotted by years on Chart No. 20, Page 171, and as with other graphs in this report a trend has been established and projected to 1945.

Two additional graphs are necessary to establish the percentage of productive new wells in relation to total wells drilled, and also the percentage of wells drilled deeper which are productive in deeper sands. These Charts Nos. 21 and 22 respectively shown on Pages 172 and 173, have been plotted from Tables 18 and 19, Pages 180 and 181. Average lines have been drawn through these graphs, and it will be noted that approximately 80% of the new wells drilled are productive, and 50% of the wells drilled deeper are productive in deeper sands.

Knowing the number of active wells as of January 1, 1939, it is possible by use of the above graphs to estimate the number of new wells which it will be necessary to drill in the future, and also the number of wells which it will be necessary to drill deeper in order to meet production demands. Table 20, on Page 182, shows in detail the method used to arrive at these figures. From Graph "A", Page 119, the estimated production in billion cubic feet has been placed under Column "A". Under Column "B" is placed the number of wells required per billion cubic feet of gas produced, this figure being taken from Chart No. 18. Column "C" is obtained by multiplying the number of wells required per billion cubic feet produced

by the estimated production in billion cubic feet or $A \times B$, and this represents the total number of wells required to meet production demands, provided no allowance is made for drilling deeper more wells than the number required as shown by Chart No. 19, Page 170. However, it is estimated that wells will be drilled deeper in excess of this number and, as shown above and by Charts Nos. 11 and 12, Pages 125 and 126, in the Historical Report, these may be substituted for some of the wells needed in the ratio of two such wells drilled deeper to one new well. This makes it possible to substitute the two Columns D1 and D2 for Column "C". Column D1 shows the estimated number of wells which can be drilled deeper (productive in deeper sands), and substituted for additional new wells. By using two of these for one new well, it is possible to reduce the total number of wells needed as shown in Column D2. Column "E" has been taken from Chart No. 20, Page 171, and shows the number of wells which it is estimated will be abandoned each year per billion cubic feet of gas produced, and by multiplying this number by the figure in Column "A", or $A \times E$, Column "F" is obtained, giving the total number of wells to be abandoned during the year. Column "G" shows the number of wells available at the beginning of any year within the scope of this report, and the figure of 1,719 at the beginning of 1939 forms the starting point for the remainder of the table. This number, 1719, includes wells which formerly belonged to the Columbia Natural Gas Company, which is now merged with The Peoples Natural Gas Company. This column will require additional explanation later. From the foregoing data, it is a simple matter to compute the number of new producing wells needed as shown in Column "H". This will be found to be the total number of wells needed, less the number available at the beginning of the year, plus the number abandoned during the year, or $D2 - G + F$. The

Column "J", or estimated number of new producing wells to be drilled has been added, since during the first two years no new wells will be needed, but it is estimated that several wells will be drilled thus lightening the burden in 1941 when it first becomes necessary to drill new wells. By applying the 80% productive factor from Chart No. 21, Page 172, to the number of producing wells to be drilled shown in Column "J", the estimated total number of wells to be drilled is obtained, and this figure is shown under Column "K". Column "G" can now be further explained. The number of wells available at the beginning of any year involves the number of new producing wells drilled during the preceding year, and therefore, could not be fully explained until Column "J" was clarified. The number of wells available at the beginning of any year is equal to the number available at the beginning of the preceding year, less the number abandoned during the preceding year, plus the number of new producing wells drilled during the preceding year, or "G" (current year) = G - F + J (preceding year).

The remainder of the table applies to wells to be drilled deeper. Column "L" shows the number of wells which must be drilled deeper, with additional gas in deeper sands, per billion cubic feet of gas produced, to maintain production from old wells. This figure is taken from Chart No. 19, Page 170, and by multiplying this number by the estimated production in billion cubic feet, the total number of productive drilling deeper operations required for this purpose is obtained. This number is shown under Column "M". In order to satisfy the conditions under Column D1 of substituting wells drilled deeper for new wells, additional drilling deeper operations must be undertaken. Column "N" shows the number of wells which, it is estimated, will have been drilled deeper (productive in deeper sands)

since December 31, 1937, that are available at the beginning of any year to satisfy this requirement. This number is obtained by adding to the number available at the beginning of the preceding year, the number of such operations during the preceding year, or "N" (current year) = $N + P$ (previous year). Column "O" shows the number of productive drilling deeper operations needed during any year to satisfy the requirements set forth in Column D1 to reduce the total number of wells needed, and is obtained by subtracting the number of such completed operations available at the beginning of the year from the total number required, or $O = D1 - N$. Column "P" shows the estimated number of wells to be drilled deeper (productive in deeper sands) during each year in excess of those under Column "M". It will be noted that while the number needed is 0 for 1938, 1939 and 1940, fifteen such operations were completed in 1938, and it is estimated that ten will be completed in each of the years 1939 and 1940. This will make it possible to satisfy the requirements for 1941 without undue hardship.

Column "Q" shows the total estimated number of productive drilling deeper operations during any year, and is the sum of wells drilled deeper to maintain production from old wells and wells drilled deeper to be substituted for new wells, or $Q = M + P$. By applying the 50% productive factor obtained from Chart No. 22, Page 173, the total number of drilling deeper operations required was obtained for each year. This is shown in Column "R".

For the year 1938, actual data is given on wells drilled deeper during the year in order to account for the fifteen wells shown available at the beginning of 1939 in Column "N". A total of twenty-four wells were drilled deeper (productive in deeper sands). From the trend shown in Chart No. 19, Page 170 it will be noted that 2.2 wells per billion

cubic feet of production were required to be drilled deeper to maintain production from old wells, and since the amount of gas produced in 1938 was 3.9 billion cubic feet, the total number of wells to be drilled deeper for this purpose is nine. This leaves fifteen wells remaining which can be classified as being available for substitution for new wells in a two to one ratio. No data is shown relative to new wells drilled in 1938, because the number of wells available at the beginning of 1939 is a matter of record, and does not need to be derived from the graphs presented.

The method of completing the table for 1939 follows: From Graph "A", Page 119, the production requirements for 1939 were taken as 4.8 billion cubic feet of gas. From Chart No. 18, Page 169, the number of wells required per billion cubic feet was estimated as 221, and by multiplying this number by 4.8, the figure shown in Column "C", 1,061, was obtained. This represents the total number of wells required. In Column "G", it will be noted that there are 1,719 wells available, therefore, no new wells will be required, and hence, no drilling deeper operations in excess of those needed to maintain production from old wells will be required. Therefore, 0 is placed in Column D1 and 1,061 carried over into Column D2. From Chart No. 20, Page 171, a figure of 5.9 is obtained as the number of wells to be abandoned per billion cubic feet of production, and this number is inserted in Column "E". By multiplying this figure by 4.8, the total number of wells to be abandoned is found to be twenty-eight. This appears in Column "F". In spite of the fact that no new wells are needed, it is estimated that fifteen new producing wells will be drilled during the year as shown in Column "J", and by applying the 80% productive factor from Chart No. 21, Page 172, it is found that an estimated total of nineteen wells will be drilled. From Chart No. 19, Page 170, it will

be noted that 2.3 wells are required to be drilled deeper (productive in deeper sands) per billion cubic feet of gas produced. This figure is placed in Column "L", and by multiplying by 4.8, it is found that a total of eleven productive drilling deeper operations will be necessary to maintain production from old wells. In addition to this number, it is estimated that ten productive drilling deeper operations will be completed to be substituted for new wells in later years when they will be needed. Thus, a total of twenty-one productive drilling deeper operations are estimated for 1939, necessitating a total of forty-two wells to be drilled deeper after applying the 50% productive factor shown on Chart No. 22, Page 173. These last two figures are placed in Columns "Q" and "R" respectively.

The procedure to be followed for the year 1940 is the same as that outlined above, and it is estimated that a total of forty new wells will be drilled, thirty-two of which will be productive; and a total of fifty wells will be drilled deeper, of which twenty-five will be productive in deeper sands. Of this number, fifteen will be required to maintain production from old wells, while ten will be available to satisfy conditions of Column D1 in the year 1941, when forty-four such wells will be required.

The year 1941 presents some new aspects since it will be noted that the wells available at the beginning of the year are not adequate to meet the requirements. During this year, it is estimated that a production of 7.7 billion cubic feet of gas will be required, and by following the outline above, a total of 1,734 wells in addition to forty-four productive deeper drilling operations will be necessary. At the beginning of the year, only 1,699 wells will be available, this figure being obtained by

subtracting from the wells available at the beginning of 1940, the number of wells to be abandoned during that year and adding the number of new producing wells drilled, or $1706 - 39 + 32$. To obtain the number of new producing wells required during 1941, it is necessary to subtract the number available at the beginning of the year from the total number required, and then add the number to be abandoned during the year, or $1,734 - 1,699 + 49 = 84$ new producing wells required. In this case, the number of wells shown in Column "J", or the number of producing wells to be drilled, corresponds with the number shown in Column "H", or the number needed. By applying the 80% productive factor, it is found that it will be necessary to drill a total of 105 wells. It will be observed that since December 31, 1937, a total of thirty-five productive drilling deeper operations, in excess of those required to maintain production from old wells, are estimated to be completed by the beginning of 1941, and these are shown in Column "H" as being available to apply on those needed in Column D1 to substitute for additional new wells. By subtracting from the 44 shown as being needed, it will be seen that nine such operations are required during the year, and it is estimated that ten wells in this class will be drilled deeper. It will also be noted that nineteen productive drilling deeper operations will be required to maintain production from old wells. Thus, a total of twenty-nine wells must be drilled deeper having additional production in deeper sands, which makes it necessary to drill deeper a total of fifty-eight wells during the year.

By following the same procedure for the years 1942, 1943, 1944 and 1945, the following results are obtained. In 1942, it is estimated that a total of 195 new wells will need to be drilled, of which 156, are estimated to be productive, and 58 wells are to be drilled deeper of which 29 are

estimated to be productive. Of these, twenty-one will be required to maintain production from old wells, while eight will be available to satisfy conditions needed to reduce the number of new wells required. In 1943, it is estimated that a total of 123 new wells will need to be drilled, of which 98 are estimated to be productive; and 58 wells are to be drilled deeper in the same manner as that shown for 1942. In 1944, it is estimated that a total of 86 new wells will need to be drilled, of which 69 are estimated to be productive, and a total of 60 wells are to be drilled deeper, of which 30 are estimated to be productive. Of these, twenty-two will be required to maintain production from old wells, and eight will be available to reduce the number of new wells required. In 1945, it is estimated that a total of 98 new wells will need to be drilled, of which it is estimated 78 will be productive; and 64 wells will be drilled deeper, of which thirty-two will be productive. Of these, twenty-three will be required to maintain production from old wells while nine will be available to reduce the number of new wells needed.

A study of the graphs and tables presented in this report indicates that it is probable that the production of The Peoples Natural Gas Company will increase from the actual figure of 3.9 billion cubic feet in 1938 to 8.2 billion cubic feet for each of the last three years within the scope of this study, namely 1943, 1944 and 1945. In order to meet this increasing demand, it is estimated that during the years 1939 to 1945, inclusive, the Company will be required to drill a total of 666 new wells, of which it is estimated, 532 will be productive. In addition to this, the Company will be required to drill a total of 427 wells to deeper sands, and it is believed that 219 of these will find additional production in deeper horizons. Of this number, 141 will be required to maintain production from old

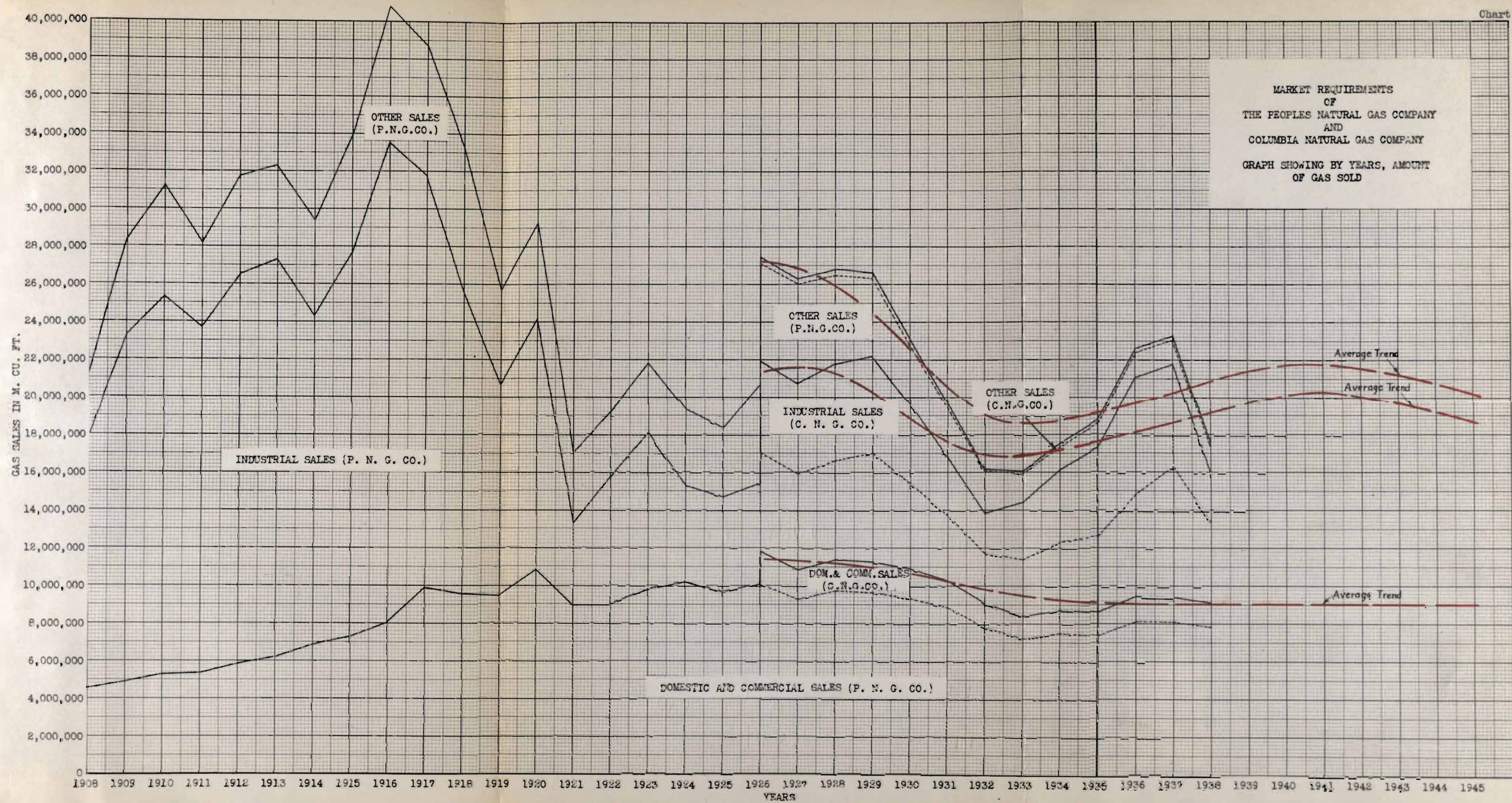
wells, and 7⁸ will be available to produce additional gas, thus limiting the number of new wells required to the figure given above. These figures relating to drilling deeper operations include actual data for 1938.

Cost

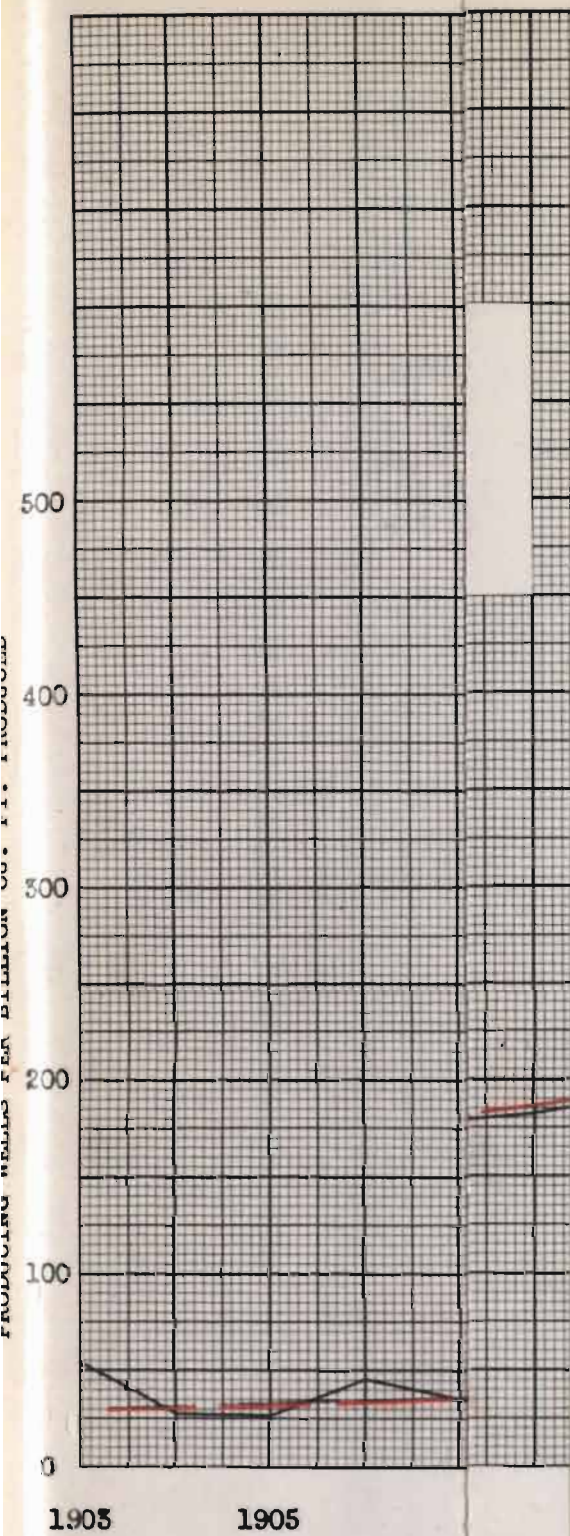
The estimated cost of developing sufficient amounts of gas to meet market requirements for the period from 1939 to 1945, inclusive, is shown in Table 21, Page 183. This table is divided into two main parts, New Wells and Drilling Deeper Operations, and each of these is further divided into Productive and Non-Productive Operations with the estimated cost of each. Costs are also totalled for each year, and totals for each operation are made for the entire period.

For the year 1939 the total cost is estimated at \$384,000; \$216,000 of this amount being used for new wells and \$168,000 for drilling deeper operations. A total cost of \$656,000 is estimated for 1940, of which \$456,000 will be used for new wells, and \$200,000 for drilling old wells deeper. The cost in 1941 is estimated to be \$1,429,000, with \$1,197,000 being needed for new wells and \$232,000 for drilling deeper. In 1942, the cost is estimated to reach a total figure of \$2,455,000, and of this amount \$2,223,000 is estimated for new wells and \$232,000 for drilling deeper operations. The estimated cost for 1943 drops to \$1,633,000 with \$1,401,000 to be used for new wells and \$232,000 for drilling deeper operations. A further drop to \$1,221,000 as the total cost of development is estimated for 1944 when \$981,000 is to be used for new wells and \$240,000 for drilling deeper operations. During 1945, the last year within the scope of this study, the total cost is estimated at \$1,372,000 with \$1,116,000 being required for new wells, and \$256,000 for drilling deeper operations.

It will be noted that the estimated total cost of development for the period is \$9,150,000. Of this amount, \$6,384,000 will be needed for productive new wells, and \$1,206,000 for non-productive wells making a total of \$7,590,000 for the 666 new wells to be drilled. For productive drilling deeper operations \$975,000 will be needed while \$585,000 is estimated for non-productive drilling deeper operations making a total of \$1,560,000 for the 390 wells which it is estimated will be drilled deeper.

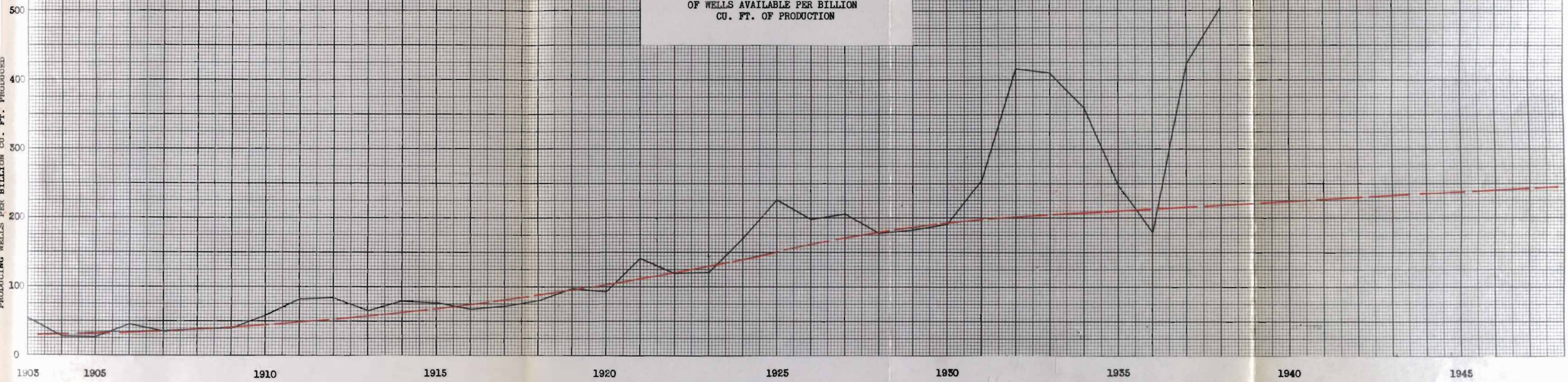


PRODUCING WELLS PER MILLION CU. FT. PRODUCTION



THE PEOPLES NATURAL GAS COMPANY (Former)
GRAPH SHOWING BY YEARS THE NUMBER
OF WELLS AVAILABLE PER BILLION
CU. FT. OF PRODUCTION

PRODUCING WELLS PER BILLION CU. FT. PRODUCED



WELLS DRILLED DEEPER (PRODUCTIVE) PER BILLION CU. FT. PRODUCED

10

8

6

4

2

0

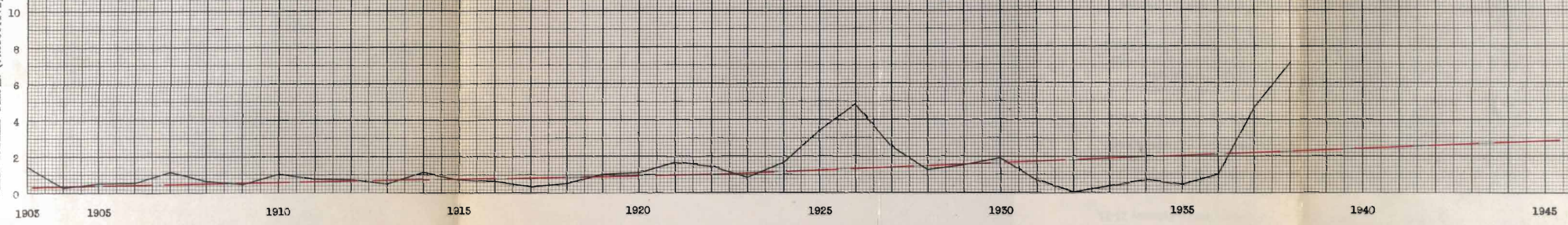
1903

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WELLS DRILLED DEEPER (PRODUCTIVE) PER BILLION CU. FT. PRODUCED

THE PEOPLES NATURAL GAS COMPANY (Former)
GRAPH SHOWING BY YEARS THE NUMBER
OF WELLS DRILLED DEEPER, PRODUCTIVE
IN DEEPER SANDS, PER BILLION CU. FT.
OF PRODUCTION



BILLION CUBIC FEET PRODUCED

THE PEOPLES NATURAL GAS COMPANY (Former)
GRAPH SHOWING BY YEARS THE NUMBER
OF WELLS ABANDONED AND SOLD PER
BILLION CU. FT. OF PRODUCTION.

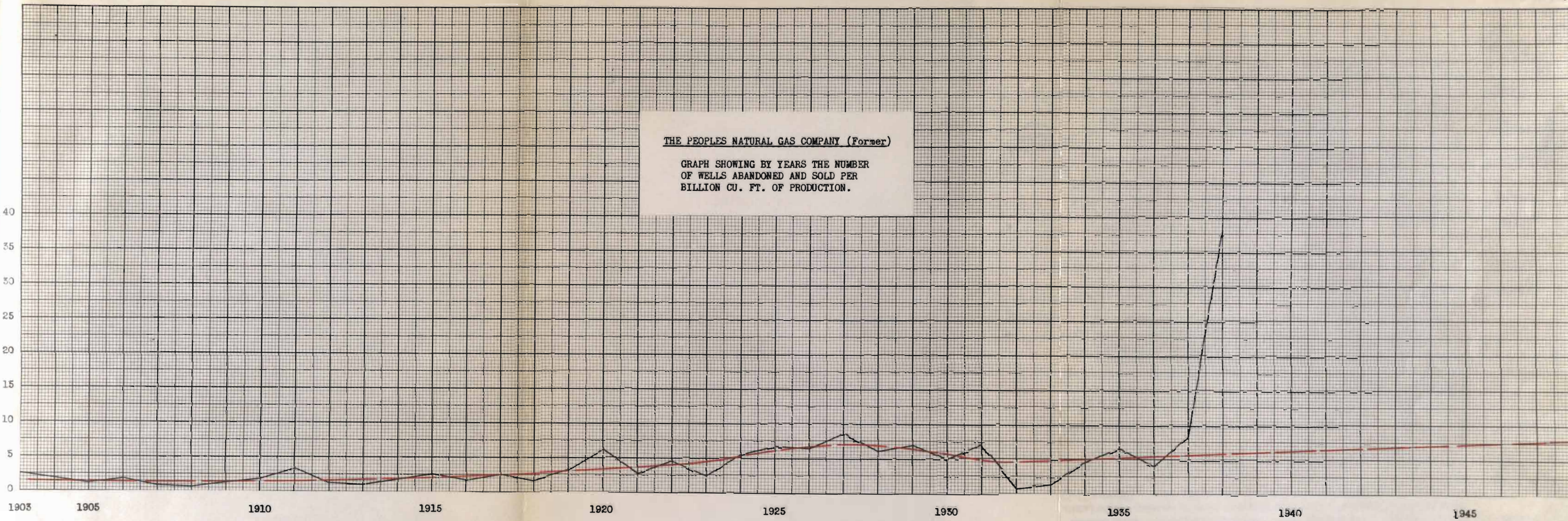


Chart 21

PER CENT OF NEW WELLS DRILLED WHICH WERE PRODUCTIVE

100

90

80

70

60

50

40

30

20

10

0

1900

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CENT
RODU

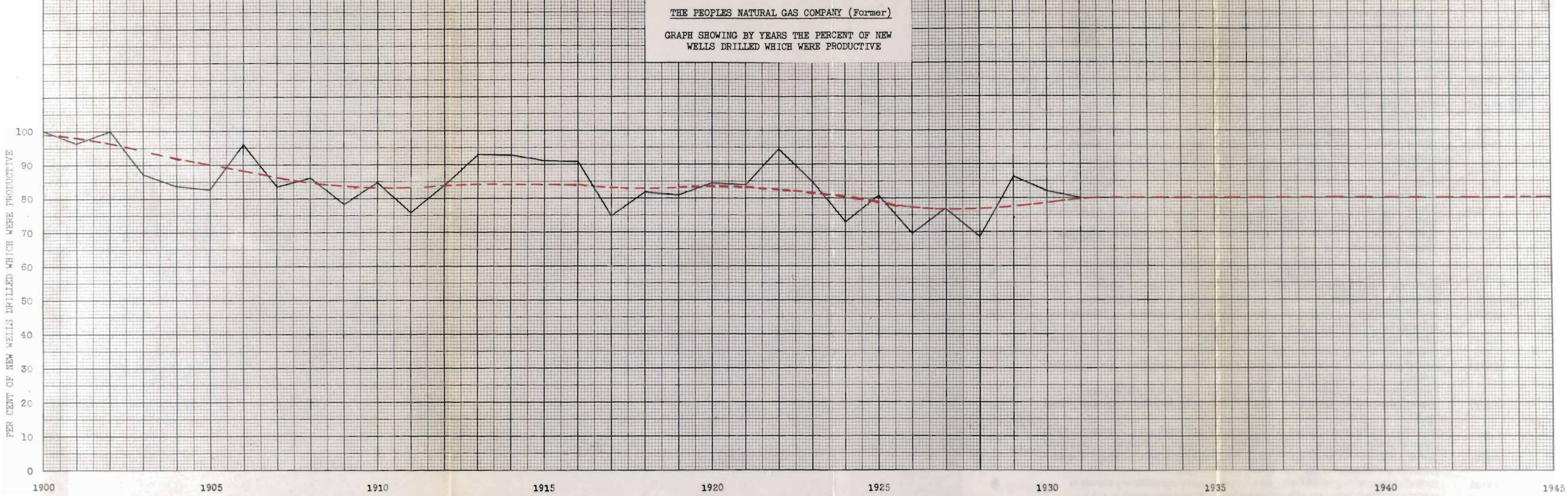


Chart 22

PER CENT OF WELLS DRILLED DEEPER WHICH
OBTAINED ADDITIONAL PRODUCTION

100

90

80

70

60

50

40

30

20

10

0

1900

PER CENT OF WELLS DRILLED DEEPER WHICH
OBTAINED ADDITIONAL PRODUCTION

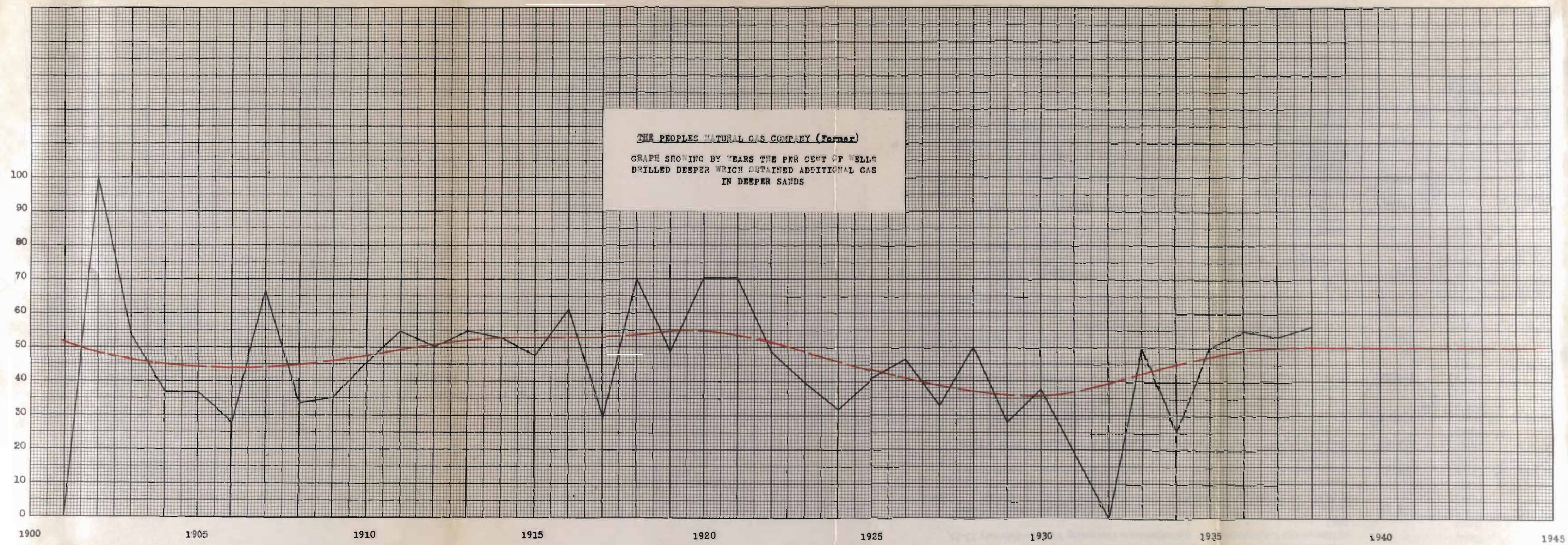


Table 11
 ALBIA NATURAL GAS COMPANY (Porter)

SOLD IN M. CUBIC FEET				
OTHER SALES				
(7)	(8)	(9)	(10)	(11)
TOTAL	P. H. G. CO.	C. H. G. CO.	TOTAL	GRAND TOTAL
13,407,214	3,308,242		3,308,242	31,182,400
18,361,007	5,078,363		5,078,363	38,337,363
19,976,805	5,963,284		5,963,284	31,249,888
16,371,712	4,486,131		4,486,131	38,197,613
20,602,124	5,300,695		5,300,695	31,778,128
21,129,150	4,973,775		4,973,775	32,279,637
17,432,319	5,018,318		5,018,318	32,279,637
20,428,413	6,123,291		6,123,291	33,787,001
22,436,837	7,386,747		7,386,747	40,825,274
21,857,811	7,004,606		7,004,606	38,777,177
12,979,630	7,770,887		7,770,887	33,329,604
11,172,327	4,997,004		4,997,004	32,668,446
12,358,325	5,072,775		5,072,775	32,530,249
4,323,960	3,737,389		3,737,389	17,034,059
6,760,780	3,466,606		3,466,606	19,208,959
8,266,912	3,760,285		3,760,285	31,848,549
5,077,229	4,052,042		4,052,042	19,320,880
5,079,644	3,699,397		3,699,397	19,327,029
10,102,502	5,232,985	297,000	5,232,985	31,469,797
9,914,316	5,275,813	298,708	5,275,813	32,332,713
10,402,506	4,772,475	373,056	4,772,475	32,074,005
10,886,979	4,748,822	307,433	4,748,822	32,027,781
8,738,162	3,274,748	229,713	3,274,748	32,734,220
6,553,862	2,702,287	193,627	2,702,287	32,774,296
4,798,823	2,509,289	24,736	2,509,289	32,774,296
6,073,744	1,238,822	12,349	1,238,822	32,020,466
2,472,232	1,279,209	190,627	1,279,209	32,778,728
8,767,702	1,260,703	128,374	1,260,703	32,778,728
17,684,707	1,280,292	277,294	1,280,292	32,000,774
12,229,476	1,264,768	756,448	1,264,768	32,227,874
6,927,291	1,489,072	773,296	1,489,072	32,227,874

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THE PEOPLES NATURAL GAS COMPANY & COLUMBIA NATURAL GAS COMPANY (Former)

(MARKET REQUIREMENTS)

TABLE SHOWING AMOUNT OF GAS SOLD IN M. CUBIC FEET

DOMESTIC AND COMMERCIAL SALES				INDUSTRIAL SALES			OTHER SALES			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
YEAR	P.N.G.CO.	C.N.G.CO.	TOTAL	P.N.G.CO.	C.N.G.CO.	TOTAL	P.N.G.CO.	C.N.G.CO.	TOTAL	GRAND TOTAL SALES
1908	4,572,944		4,572,944	13,407,214		13,407,214	3,202,242		3,202,242	21,182,400
1909	4,891,992		4,891,992	18,361,007		18,361,007	5,078,363		5,078,363	28,331,362
1910	5,310,193		5,310,193	19,976,205		19,976,205	5,963,284		5,963,284	31,249,682
1911	5,339,770		5,339,770	18,371,712		18,371,712	4,486,131		4,486,131	28,197,613
1912	5,875,309		5,875,309	20,602,154		20,602,154	5,300,695		5,300,695	31,778,158
1913	6,176,709		6,176,709	21,129,150		21,129,150	4,973,772		4,973,772	32,279,631
1914	6,868,083		6,868,083	17,435,319		17,435,319	5,018,318		5,018,318	29,321,720
1915	7,235,897		7,235,897	20,428,413		20,428,413	6,123,291		6,123,291	33,787,601
1916	8,089,602		8,089,602	25,436,831		25,436,831	7,326,141		7,326,141	40,852,574
1917	9,908,734		9,908,734	21,857,811		21,857,811	7,004,606		7,004,606	38,771,151
1918	9,579,087		9,579,087	15,979,630		15,979,630	7,770,887		7,770,887	33,329,604
1919	9,496,711		9,496,711	11,175,231		11,175,231	4,997,004		4,997,004	25,668,946
1920	10,889,245		10,889,245	13,328,332		13,328,332	5,012,772		5,012,772	29,230,349
1921	8,979,280		8,979,280	4,323,960		4,323,960	3,731,389		3,731,389	17,034,629
1922	9,035,572		9,035,572	6,760,780		6,760,780	3,466,606		3,466,606	19,262,958
1923	9,820,785		9,820,785	8,266,912		8,266,912	3,760,582		3,760,582	21,848,279
1924	10,217,949		10,217,949	5,077,295		5,077,295	4,025,642		4,025,642	19,320,886
1925	9,651,818		9,651,818	5,019,844		5,019,844	3,659,397		3,659,397	18,331,059
1926	10,152,754	1,686,904	11,839,658	5,243,897	4,861,605	10,105,502	5,232,982	291,055	5,524,037	27,469,197
1927	9,325,123	1,521,553	10,846,676	5,124,364	4,789,952	9,914,316	5,312,813	258,708	5,571,521	26,332,513
1928	9,739,426	1,640,932	11,380,358	5,215,444	5,189,762	10,405,206	4,715,412	313,026	5,028,438	26,814,002
1929	9,687,764	1,626,163	11,313,927	5,741,460	5,145,519	10,886,979	4,148,822	301,453	4,450,275	26,651,181
1930	9,374,226	1,527,896	10,902,124	4,561,325	4,176,840	8,738,165	3,274,748	239,513	3,514,261	23,154,550
1931	8,879,485	1,415,308	10,294,793	3,489,769	3,064,096	6,553,865	2,702,287	163,651	2,865,938	19,714,596
1932	7,804,049	1,269,541	9,073,590	2,698,751	2,100,082	4,798,833	2,209,289	94,756	2,304,045	16,176,468
1933	7,229,193	1,175,955	8,405,148	2,993,790	3,019,354	6,013,144	1,538,825	73,349	1,612,174	16,030,466
1934	7,479,970	1,245,826	8,725,796	3,628,826	3,783,406	7,412,232	1,219,509	160,621	1,380,130	17,518,158
1935	7,379,070	1,240,427	8,619,497	3,996,563	4,710,539	8,707,102	1,260,103	158,314	1,418,417	18,745,016
1936	8,082,361	1,341,799	9,424,160	5,474,394	6,209,707	11,684,101	1,280,592	211,264	1,491,856	22,600,117
1937	8,055,208	1,325,914	9,381,122	6,915,631	5,443,845	12,359,476	1,364,768	126,448	1,491,216	23,231,814
1938	7,811,551	1,282,725	9,094,276	4,182,074	2,515,493	6,697,567	1,489,012	113,996	1,603,008	17,394,851

THE PEOPLES NATURAL GAS COMPANY & COLUMBIA NATURAL GAS COMPANY (Former)

(SOURCE OF SUPPLY)

TABLE SHOWING AMOUNT OF GAS PRODUCED AND PURCHASED IN M. CUBIC FEET

PRODUCED				PURCHASED BY THE PEOPLES NATURAL GAS COMPANY						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
YEAR	BY P.N.G.CO.	BY C.N.G.CO.	TOTAL PRODUCED	FROM HOPE N.G. COMPANY	FROM N.Y. STATE N.G. CORP.	FROM OTHER SOURCES	TOTAL PURCH. BY P.N.G.CO.	PURCH. BY C.N.G.CO. COMPANY	TOTAL PURCH. BY P.N.G.CO. & C.N.G.CO.	TOTAL PROD. & PUR BY P.N.G.CO & C.N.G.CO.
1903	5,557,188		5,557,188							
1904	12,590,828		12,590,828							
1905	13,980,234		13,980,234	3,066,469		1,54,301	3,220,770		3,220,770	17,201,004
1906	8,531,010		8,531,010	12,037,710		349,448	12,387,158		12,387,158	20,918,168
1907	11,762,367		11,762,367	13,025,615		399,253	13,424,868		13,424,868	25,187,235
1908	13,416,128		13,416,128	7,081,674		685,214	7,766,888		7,766,888	21,183,016
1909	13,215,414		13,215,414	14,547,767		568,181	15,115,948		15,115,948	28,331,362
1910	9,570,665		9,570,665	20,427,446		1,251,571	21,679,017		21,679,017	31,249,682
1911	7,414,355		7,414,355	19,855,811		927,447	20,783,258		20,783,258	28,197,613
1912	7,801,806		7,801,806	23,303,041		673,311	23,976,352		23,976,352	31,778,158
1913	10,963,966		10,963,966	20,176,604		1,139,061	21,315,665		21,315,665	32,279,631
1914	9,382,830		9,382,830	17,919,695		2,019,195	19,938,890		19,938,890	29,321,720
1915	10,100,508		10,100,508	21,597,627		2,089,466	23,687,093		23,687,093	33,787,601
1916	13,152,893		13,152,893	26,251,185		1,448,496	27,699,681		27,699,681	40,852,574
1917	14,041,262		14,041,262	23,276,116		1,453,773	24,729,889		24,729,889	38,771,151
1918	13,850,362		13,850,362	18,203,928		1,269,314	19,479,242		19,479,242	33,329,604
1919	12,223,833		12,223,833	6,496,994		6,948,119	13,445,113		13,445,113	25,668,946
1920	12,293,239		12,293,239	9,219,309		7,717,801	16,937,110		16,937,110	29,230,349
1921	8,347,043		8,347,043	3,769,608		4,917,978	8,687,586		8,687,586	17,034,629
1922	9,913,261		9,913,261	3,036,168		6,313,529	9,349,697		9,349,697	19,262,958
1923	9,984,853		9,984,853	4,073,037		7,790,389	11,863,426		11,863,426	21,848,279
1924	7,230,277		7,230,277	2,295,279		9,795,330	12,090,609		12,090,609	19,320,886
1925	5,454,766		5,454,766	945,742		11,930,551	12,876,293		12,876,293	18,331,059
1926	6,148,255	4,719,251	10,867,506	3,152,489		12,589,968	15,742,457	859,234	16,601,691	27,469,197
1927	5,859,398	4,580,936	10,440,334	2,301,508		12,263,954	14,565,462	1,326,717	15,892,179	26,332,513
1928	7,068,905	4,818,568	11,887,473	3,264,379		10,480,400	13,744,779	1,181,740	14,926,519	26,813,992
1929	6,451,119	4,106,182	10,557,301	3,905,648		10,500,860	14,406,508	1,687,372	16,093,880	26,651,181
1930	6,262,014	3,746,052	10,008,066	3,845,508		8,202,321	12,047,829	1,098,655	13,146,484	23,154,550
1931	4,568,862	3,429,706	7,998,568	3,583,849		7,046,744	10,630,593	1,085,435	11,716,028	19,714,596
1932	2,783,626	2,789,960	5,573,586	3,588,627		6,271,462	9,860,089	742,793	10,602,882	16,176,468
1933	2,812,075	2,673,589	5,485,664	3,815,012		5,761,966	9,576,978	967,824	10,544,802	16,030,466
1934	3,150,717	3,347,374	6,498,091	4,177,385		5,841,867	10,019,252	1,000,815	11,020,067	17,518,158
1935	4,486,697	3,094,621	7,581,318	3,765,821		6,483,038	10,248,859	914,839	11,163,698	18,745,016
1936	6,045,209	3,863,296	9,908,505	3,862,084	181,993	7,551,068	11,595,145	1,096,467	12,691,612	22,600,117
1937	2,526,467	1,702,092	4,228,559	3,506,013	8,207,328	6,224,713	17,938,054	1,065,201	19,003,255	23,231,814
1938	1,987,981	1,956,702	3,944,683	2,870,545	4,492,552	5,153,259	12,516,356	933,812	13,450,168	17,394,851

THE PEOPLES NATURAL GAS COMPANYTable 13ESTIMATED MARKET REQUIREMENTS IN M. C. F. - 1939 to 1945, Inc.

<u>Market</u>	<u>Domestic & Commercial</u>	<u>Industrial</u>	<u>Other Markets</u>	<u>Total</u>
1939	9,000,000	10,600,000	1,800,000	21,400,000
1940	9,000,000	11,100,000	1,600,000	21,700,000
1941	9,000,000	11,300,000	1,400,000	21,700,000
1942	9,000,000	11,000,000	1,500,000	21,500,000
1943	9,000,000	10,600,000	1,600,000	21,200,000
1944	9,000,000	10,100,000	1,600,000	20,700,000
1945	9,000,000	9,600,000	1,600,000	20,200,000

ESTIMATED SOURCE OF SUPPLY IN M.C.F.-1939 to 1945, Inc.Table 14

	<u>Pro- duction</u>	<u>Purchased From Hose N.G.Co.</u>	<u>Purchased From N.Y. S.N.G.Corp.</u>	<u>Purchased From Other Sources</u>	<u>Total Prod.& Pur.</u>
1939	4,800,000	5,000,000	4,600,000	7,000,000	21,400,000
1940	6,400,000	7,500,000	1,300,000	6,500,000	21,700,000
1941	7,700,000	8,000,000	0	6,000,000	21,700,000
1942	8,100,000	8,000,000	0	5,400,000	21,500,000
1943	8,200,000	8,000,000	0	5,000,000	21,200,000
1944	8,200,000	8,000,000	0	4,500,000	20,700,000
1945	8,200,000	8,000,000	0	4,000,000	20,200,000

THE PEOPLES NATURAL GAS COMPANY (Former)

TABLE SHOWING BY YEARS,
NUMBER OF WELLS AVAILABLE PER BILLION CUBIC FEET OF PRODUCTION

(1)	(2)	(3)	(4)
YEAR	PRODUCTION IN BILLION CUBIC FEET	NUMBER OF WELLS AVAILABLE	NO. OF WELLS PER BILLION CUBIC FEET
1903	5.56	281	50.6
1904	12.59	336	26.7
1905	13.98	358	25.6
1906	8.53	371	43.5
1907	11.76	407	34.6
1908	13.42	526	39.2
1909	13.22	528	39.9
1910	9.57	553	57.8
1911	7.41	608	82.1
1912	7.80	650	83.4
1913	10.96	719	65.6
1914	9.38	742	79.1
1915	10.10	774	76.6
1916	13.15	888	67.5
1917	14.04	1,009	71.8
1918	13.85	1,100	79.5
1919	12.22	1,188	97.3
1920	12.29	1,152	93.7
1921	8.35	1,178	141.0
1922	9.91	1,174	118.5
1923	9.98	1,213	121.6
1924	7.23	1,226	169.5
1925	5.45	1,229	225.3
1926	6.15	1,219	198.1
1927	5.86	1,201	205.0
1928	7.07	1,186	167.7
1929	6.45	1,167	180.9
1930	6.26	1,179	188.3
1931	4.57	1,153	252.5
1932	2.78	1,152	414.5
1933	2.81	1,148	408.0
1934	3.15	1,134	360.0
1935	4.49	1,105	246.0
1936	6.05	1,081	178.6
1937	2.53	1,062	419.5
1938	1.99	1,004	504.5

THE PEOPLES NATURAL GAS COMPANY (Former)

TABLE SHOWING BY YEARS,
NUMBER OF PRODUCTIVE DRILLING DEEPER OPERATIONS
PER BILLION CUBIC FEET OF PRODUCTION

(1)	(2)	(3)	(4)
Year	Production in Billion Cubic Feet	No. of Wells D.D. With Additional Prod. in Dpr. Sands	No. of Wells D.D. (Prod.) Per Bil- lion Cubic Feet
1903	5.56	8	1.44
1904	12.59	4	0.32
1905	13.98	8	0.57
1906	8.53	5	0.59
1907	11.76	14	1.19
1908	13.42	9	0.67
1909	13.22	7	0.53
1910	9.57	10	1.05
1911	7.41	6	0.81
1912	7.80	6	0.77
1913	10.96	6	0.55
1914	9.38	11	1.17
1915	10.10	8	0.79
1916	13.15	8	0.61
1917	14.04	5	0.36
1918	13.85	7	0.51
1919	12.22	13	1.06
1920	12.29	14	1.14
1921	8.35	14	1.68
1922	9.91	15	1.51
1923	9.98	9	0.90
1924	7.23	12	1.66
1925	5.45	19	3.48
1926	6.15	30	4.88
1927	5.86	15	2.56
1928	7.07	9	1.27
1929	6.45	10	1.55
1930	6.28	12	1.92
1931	4.57	3	0.66
1932	2.78	0	0.00
1933	2.81	1	0.36
1934	3.15	2	0.64
1935	4.49	2	0.45
1936	6.05	6	0.99
1937	2.53	9	3.56
1938	1.99	14	7.04

THE PEOPLES NATURAL GAS COMPANY (Former)

TABLE SHOWING BY YEARS
NUMBER OF WELLS ABANDONED AND SOLD PER BILLION CUBIC FEET OF PRODUCTION

(1)	(2)	(3)	(4)
Year	Production In Billion Cu. Ft.	Number of Wells Abandoned and Sold	Number of Wells Abandoned and Sold Per Billion Cubic Feet
1903	5.56	14	2.52
1904	12.59	22	1.75
1905	13.98	15	1.07
1906	8.53	15	1.76
1907	11.76	10	0.85
1908	13.42	9	0.67
1909	13.22	16	1.21
1910	9.57	18	1.88
1911	7.41	24	3.24
1912	7.90	9	1.15
1913	10.96	11	1.00
1914	9.38	15	1.60
1915	10.10	25	2.48
1916	13.15	20	1.52
1917	14.04	33	2.35
1918	13.85	21	1.52
1919	12.22	37	3.03
1920	12.29	73	5.95
1921	8.35	21	2.52
1922	9.91	39	4.28
1923	9.98	22	2.21
1924	7.23	38	5.26
1925	5.45	35	6.42
1926	6.15	36	6.18
1927	5.86	49	8.36
1928	7.07	42	5.95
1929	8.45	44	6.82
1930	6.26	30	4.79
1931	4.57	31	6.79
1932	2.78	2	0.72
1933	2.81	4	1.42
1934	3.15	14	4.45
1935	4.49	29	6.45
1936	6.05	24	3.97
1937	2.53	21	8.30
1938	1.99	74	37.20

TABLE SHOWING BY YEARS
THE PER CENT OF NEW WELLS DRILLED WHICH WERE PRODUCTIVE

(1)	(2)	(3)	(4)
Year	Total No. Of New Wells Drilled	No. of New Wells Which Were Pro- ductive-*	Per Cent of New Wells Productive
1900	23	23	100.00
1901	28	27	96.50
1902	39	39	100.00
1903	31	27	87.10
1904	43	36	83.75
1905	41	34	82.95
1906	25	24	96.00
1907	48	40	83.35
1908	36	31	86.15
1909	23	18	78.25
1910	45	38	84.50
1911	37	28	75.70
1912	55	46	83.70
1913	84	78	92.90
1914	40	37	92.50
1915	55	50	91.00
1916	139	126	90.60
1917	198	148	74.75
1918	136	111	81.55
1919	100	81	81.00
1920	44	37	84.10
1921	56	47	83.95
1922	35	33	94.30
1923	72	61	84.75
1924	70	51	72.90
1925	41	33	80.50
1926	36	25	69.45
1927	39	30	76.95
1928	35	24	68.55
1929	29	25	86.20
1930	50	41	82.00
1931	5	4	80.00
1932	0	0	0.00
1933	0	0	0.00
1934	0	0	0.00
1935	0	0	0.00
1936	0	0	0.00
1937	2	2	100.00
1938	1	0	0.00

*-Includes Wells Sold Same Year in Which They Were Drilled.

THE PEOPLE'S NATURAL GAS COMPANY (Former)

TABLE SHOWING BY YEARS
THE PER CENT OF WELLS DRILLED DEEPER WHICH WERE PRODUCTIVE
IN DEEPER SANDS

(1)	(2)	(3)	(4)
Year	Total No. Of Wells Drilled Deeper	No. of Wells Drilled Deeper Productive in Deeper Sands	% of Wells Drilled Deeper Productive in Deeper Sands
1900	-	-	-
1901	1	0	0.00
1902	1	1	100.00
1903	15	8	53.33
1904	11	4	36.36
1905	22	8	36.36
1906	18	5	27.78
1907	21	14	66.67
1908	27	9	33.33
1909	20	7	35.00
1910	22	10	45.45
1911	11	6	54.55
1912	12	6	50.00
1913	11	6	54.55
1914	21	11	52.38
1915	17	8	47.06
1916	13	8	61.50
1917	17	5	29.40
1918	10	7	70.00
1919	27	13	48.15
1920	20	14	70.00
1921	20	14	70.00
1922	31	15	48.40
1923	23	9	39.13
1924	38	12	31.57
1925	47	19	40.40
1926	65	30	46.15
1927	46	15	32.60
1928	18	9	50.00
1929	36	10	27.76
1930	32	12	37.50
1931	16	3	18.75
1932	1	0	0.00
1933	2	1	50.00
1934	8	2	25.00
1935	4	2	50.00
1936	11	6	54.55
1937	17	9	52.94
1938	25	14	56.00

THE PEOPLES NATURAL GAS COMPANY

TABLE SHOWING ESTIMATED PRODUCTION BY YEARS FROM 1939 TO 1945, INCLUSIVE,
AND ESTIMATED NUMBER OF NEW WELLS AND DRILLING DEEPER OPERATIONS REQUIRED,
WITH ANALYSIS OF THE METHODS USED TO OBTAIN SAME

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)	(Q)	(R)		
TO BE SUBSTITUTED FOR "C" -- //																			
YEAR	EST. PRO- DUCTION IN BILLION CU. FEET (FROM GRAPH "A", PAGE 119)	EST. NO. OF WELLS REQUIRED PER BILLION CU. FEET OF PRODU- TION (FROM GRAPH 18, PAGE 159)	EST. TOTAL NO. OF WELLS NEEDED IF NO ALLOWANCE IS MADE FOR SUBSTITUTING WELLS TO BE DRILLED DEEPER FOR NEW WELLS. (A x B)	ESTIMATED NUMBER OF WELLS NEEDED TO BE DRILLED DEEPER (PRODUC- TIVE IN DEEPER SANDS) AFTER DEC. 31, 1937 TO BE SUBSTI- TUTED FOR NEW WELLS	ESTIMATED TOTAL NO. OF WELLS NEEDED AFTER ALLOW- ANCE HAS BEEN MADE FOR SUBSTITU- TING WELLS TO BE DRILL- ED DEEPER FOR NEW WELLS	EST. NO. OF WELLS TO BE ADDED PER BILLION CUBIC FEET OF PRODU- TION (FROM GRAPH 20, PAGE 171)	EST. TOTAL NO. OF WELLS NEEDED AFTER ALLOWANCE HAS BEEN MADE FOR SUBSTITU- TING WELLS TO BE DRILL- ED DEEPER FOR NEW WELLS (A x E)	EST. NO. OF WELLS AVAILABLE AT BEGINNING OF YEAR (G-F+J)	ESTIMATED NUMBER OF NEW PRODUC- ING WELLS NEEDED (DE-G+F)	ESTIMATED NUMBER OF NEW PRODUCING WELLS TO BE DRILLED	ESTIMATED TOTAL NO. OF NEW WELLS TO BE DRILLED (ESTIMATED 50% PRODUC- TIVE FROM GRAPH 21, PAGE 172) (J ÷ 50%)	ESTIMATED NO. OF WELLS TO BE DRILL- ED DEEPER (HAVING PRO- DUCTION IN DEEPER SANDS) PER BILLION CU. FT. OF PRODU- CTION TO MAIN- TAIN PRODU- TION FROM OLD WELLS. FROM GRAPH 19, PAGE 170	EST. TOTAL NO. OF WELLS TO BE DRILLED DEEPER (HAVING PRODUCTION IN DEEPER SANDS) TO MAINTAIN PRODUC- TION FROM OLD WELLS (A x L)	EST. NO. OF WELLS DRILL- ED DEEPER AFTER DEC. 31, 1937 (PRO- DUCTIVE IN DEEPER SANDS) IN EXCESS OF WELLS DRILL- ED DEEPER TO MAIN- TAIN PRO- DUCTION FROM OLD WELLS AVAILABLE AT BEGINNING OF YEAR. (N-F FOR PREVIOUS YEAR	ESTIMATED NO. OF WELLS NEEDED TO BE DRILLED DEEPER (PRO- DUCTIVE IN DEEPER SANDS) IN EXCESS OF WELLS DRILLED DEEPER TO MAINTAIN PRODUC- TION FROM OLD WELLS. (O - N)	EST. NO. OF WELLS TO BE DRILLED DEEPER (PRODUC- TIVE IN DEEPER SANDS) IN EXCESS OF WELLS DRILL- ED DEEP- ER TO MAIN- TAIN PRO- DUCTION FROM OLD WELLS (N + P)	EST. TOTAL NO. OF WELLS TO BE DRILLED DEEPER (PRODUC- TIVE IN DEEPER SANDS) (M + P)	ESTIMATED TOTAL NO. OF WELLS TO BE DRILLED DEEPER (ESTIMATED 50% PRODUC- TIVE - FROM GRAPH 22, PAGE 173) (Q ÷ 50%)	
1938	ACTUAL	3.9										2.2	9		0	15	24	37	
1939	ESTIMATED	4.8	221	1,061	0	1,061	5.9	28	1,719	0	15	19	2.3	11	15	0	10	21	42
1940	"	6.4	225	1,440	0	1,440	6.1	39	1,706	0	32	40	2.4	15	25	0	10	25	50
1941	"	7.7	228	1,756	44	1,734	6.3	49	1,699	84	84	105	2.5	19	35	9	10	29	58
1942	"	8.1	230	1,863	52	1,837	6.5	53	1,734	156	156	195	2.6	21	45	7	8	29	58
1943	"	8.2	233	1,919	60	1,880	6.7	55	1,837	98	98	123	2.6	21	53	7	8	29	58
1944	"	8.2	235	1,927	68	1,893	6.8	56	1,880	69	69	86	2.7	22	61	7	8	30	60
1945	"	8.2	238	1,952	78	1,913	7.1	58	1,893	78	78	98	2.8	23	69	9	9	32	64
TOTALS.....							338		532		666		1418		788	2198	4278		

— THE TWO COLUMNS UNDER (D) MAY BE SUBSTITUTED FOR COLUMN (C) DUE TO THE RELATIONSHIP EXISTING BETWEEN WELLS DRILLED DEEPER (PRODUCTIVE IN DEEPER SANDS) AND NEW PRODUCTIVE WELLS. AS SHOWN BY GRAPHS 11 AND 12, PAGES 125 AND 126, IN THE HISTORICAL REPORT, THE RESERVE DEVELOPED BY TWO SUCH WELLS DRILLED DEEPER IS EQUIVALENT TO THE RESERVE DEVELOPED BY ONE NEW WELL.

— INCLUDES ACTUAL FIGURES FOR 1938

Table 21

THE PEOPLES NATURAL GAS COMPANY

TABLE SHOWING THE ESTIMATED COST OF DEVELOPING SUFFICIENT AMOUNTS OF GAS
TO MEET ESTIMATED MARKET REQUIREMENTS FROM 1939 TO 1945, INCLUSIVE

NEW WELLS NEW WELLS NEW WELLS

DRILLING DEEPER OPERATIONS

Year	Estimated Number of Productive Wells to Be Drilled	Estimated Cost of Productive Wells at \$12,000	Estimated Number of Non-Pro- ductive Wells to Be Drilled	Estimated Cost of Non-Pro- ductive Wells at \$9,000	Estimated Total Number Of New Wells	Estimated Cost of New Wells	Estimated Number of Productive Deeper Operations	Estimated Cost of Productive Drilling Deeper Operations At \$5,000	Estimated Number of Non-Pro- ductive Drilling Deeper Operations	Estimated Cost of Non-Pro- ductive Drilling Deeper Operations At \$3,000	Estimated Total Number of Drilling Deeper Operations	Estimated Cost of Drilling Deeper Operations	Estimated Total Cost Of New Wells and Drilling Deeper Operations
1939	15	\$ 180,000	4	\$ 36,000	19	\$ 216,000	21	\$105,000	21	\$ 63,000	42	\$ 168,000	\$ 384,000
1940	32	\$ 384,000	8	\$ 72,000	40	\$ 456,000	25	\$125,000	25	\$ 75,000	50	\$ 200,000	\$ 656,000
1941	84	\$1,008,000	21	\$ 189,000	105	\$1,197,000	29	\$145,000	29	\$ 87,000	58	\$ 232,000	\$1,429,000
1942	156	\$1,872,000	39	\$ 351,000	195	\$2,223,000	29	\$145,000	29	\$ 87,000	58	\$ 232,000	\$2,455,000
1943	98	\$1,176,000	25	\$ 225,000	123	\$1,401,000	29	\$145,000	29	\$ 87,000	58	\$ 232,000	\$1,633,000
1944	69	\$ 828,000	17	\$ 153,000	86	\$ 981,000	30	\$150,000	30	\$ 90,000	60	\$ 240,000	\$1,221,000
1945	<u>78</u>	<u>\$ 936,000</u>	<u>20</u>	<u>\$ 180,000</u>	<u>98</u>	<u>\$1,116,000</u>	<u>32</u>	<u>\$160,000</u>	<u>32</u>	<u>\$ 96,000</u>	<u>64</u>	<u>\$ 256,000</u>	<u>\$1,372,000</u>
TOTALS	532	\$6,384,000	134	\$1,206,000	666	\$7,590,000	195	\$975,000	195	\$585,000	390	\$1,560,000	\$9,150,000

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