REPORT OF STATE NATURAL GAS SUPERVISOR.

LETTER OF TRANSMITTAL.

Office of Natural Gas Supervisor,
Kokomo, Ind., January 13, 1901.

Prof. W. S. Blatchley, State Geologist:

Sir—I herewith transmit to you the tenth annual report from this department. It is made in obedience to Section 7504 of the Revised Statutes of the State of Indiana, and is for the year ending December 31, 1901.

For reasons that are patent to every person at all acquainted with the present condition of the gas field, and that are made plain in the body of the report, it is not as comprehensive as former reports, or as I would like to have made it. As the chief interest at this time centers around the condition of the gas field, most space is given to that subject.

In closing this, my seventh year's work, I am pleased to acknowledge the very cordial support that I have received from you from the beginning. Yours respectfully,

J. C. LEACH,
State Natural Gas Supervisor.
THE INDIANA NATURAL GAS FIELD.

Before this report is published, sixteen years will have elapsed since the first gas well was drilled in what is known as the Indiana Natural Gas Field. For persons who are acquainted with the history of this field, it is difficult to believe that people living in this section of the State have ever fully considered or appreciated the wealth and happiness that that first well opened to them. To give the early history of this field now would simply be to give a rehash of former reports, and as the chief interest now centers around present conditions rather than past history, most space is given to the former subject. However, it may not be amiss to again state that soon after the first gas well was drilled and it was known that the Trenton limestone, over a small area of the State, at least, was a gas-producing rock, numerous companies were organized to seek the new fuel. Though the explorations for gas were not confined to any one section of the State, it was only in the east central section that gas was found in commercially valuable quantities. The productive gas area was soon located. The development of the field, the location of factories and the phenomenal growth of cities and towns within the gas area are all common history—a history in many respects worthy of the intelligence and energy of those who helped to make it, and one of which the entire State may be proud. But, while this is true, there is no denying the fact that the history of this section of the State might have been much different; that the manufacturing and commercial prospects might have been brighter, if this fuel resource had been used from the beginning in a manner such as is warranted by its value. This statement will be fully understood by those manufacturers who have been short of gas, or who have been compelled to seek another fuel.

THE WASTE OF NATURAL GAS DURING THE EARLY HISTORY OF THE FIELD.

The seeming indifference throughout the gas field regarding the waste of gas that prevailed for a number of years after its discovery is well known to most readers of this report. It is a subject that
has been given much space in former reports, and one that has merited more serious consideration from all classes of consumers of this gaseous fuel than it has received. And, however useless it may be at this time to speak of the subject, and however humiliating it may be in the face of present conditions to those who encouraged the vandal-like waste of the past, it is but just, I think, that it be held up before the public once more that the responsibility for the present condition of the natural gas supply, in so far as the waste of this fuel has contributed to it, be placed where it belongs. I do not intimate that the supply was sufficient for all time, provided it had been used as economically as other fuels are used, but I do believe that such use would have added a number of years to the life of the field. This statement will certainly not be questioned by people who are at all acquainted with the history of the field.

That natural gas is one of the most valuable resources of the State will not admit of argument. That its value warrants great care in using it to prevent waste is equally true. That the greatest indifference was manifested for many years toward the way it was used throughout the field, on the part of those that should have been most interested in the life of the field, and that in some places the most inexcusable classes of waste were really encouraged, are matters of common knowledge to those at all acquainted with the past of this field. At one time different localities seemed to vie with each other as to the amount of gas they could waste. Gas wells with a daily capacity of from 5,000,000 to 10,000,000 cubic feet were permitted to flow “full head” into the air for weeks at a time. At some places the burning gas from these open wells illumined the country for miles around. Arches of gas pipe, supporting hundreds of natural gas torches, were raised over the principal streets of cities and towns. Farm yards throughout the field were made light as day with natural gas, and where the use was for legitimate purposes it was most extravagant. At the present time, when there is a shortage of gas on every hand, it is indeed difficult to believe that conditions such as have been stated, ever existed.

In thinking of these conditions, it is but natural that we inquire the cause; the purpose in permitting this natural resource that has brought so much wealth to this section of the State to escape into the air without even a small per cent. of its value being realized. While most of the waste spoken of was willful and the possible effect upon the supply stored in the gas reservoir received but little consideration, it is certain that there was no thought of a final exhaustion of the field. Indeed, questions relating to the economic use of nat-
ural gas and the future of the supply received scant consideration from any one except geologists. While but little effort was made to account for the origin of the new fuel, nearly all reached the happy conclusion that its life would be equal to all time. Why give any attention to questions involved in the generation, storage or pressure of natural gas when the supply is inexhaustible? Most consumers at the time of which I am speaking knew but little about this fuel, except what they saw at the point of consumption, and to those within the gas area there was but little evidence for many years that the supply was gradually being exhausted. It seems that for a number of years everything conspired to create a feeling of security in the minds of the people regarding the supply of this fuel, and tended to encourage open-handedness in dispensing its privileges. I think, then, that the prevailing opinion during the early history of the field, that the supply of gas was inexhaustible, and also the feeling of security regarding the fuel problem that was created thereby, caused much of the indifference that seemingly existed toward the waste of gas. With no desire to show a spirit of "I told you so," I believe it to be due this office to say that from the beginning the annual reports of the State Natural Gas Supervisor have stated and restated that the stock of natural gas was practically complete; that when once exhausted, there was no provision in nature for its renewal. The public has not been asked to accept these statements, only as logical conclusions based upon unquestionable facts. But, however logical a conclusion given out from this department might be, if it intimated that the supply of gas would ever show signs of exhaustion, it was cast aside, and the Natural Gas Supervisor was branded as an enemy to the gas belt.

Laws Enacted to Prevent Waste.

As early as 1889, the General Assembly of the State took cognizance of the great value of natural gas as a fuel and the possibility of a final exhaustion of the field, and enacted a law prohibiting the transportation of natural gas out of the State. Afterward, various other laws were enacted to protect the gas field. Some of these laws have been held to be unconstitutional by the courts, especially the first mentioned; but most of those enacted to prevent waste are valid, and a rigid enforcement of the same from the date of enactment would have done much to prolong the life of the field. For a number of years it was most impossible to enforce the law, primarily because the people had decided that there was enough gas to last forever.
As those who chose to accept this theory were unable to give valid reasons for so doing, they gave as a further reason for opposing the enforcement of the law that natural gas is property, and, as such, the owner has a right to use it as he desires. This was the prevailing opinion, and is yet of some people on whose land gas wells are located; notwithstanding the fact that the courts have held that the enforcement of the law is but a judicious exercise of the police powers of the State; that the welfare and prosperity of the public overshadows the good of the individual. After all, the chief opposition to the enforcement of the law came from the erroneous idea prevailing regarding the permanency of the supply of gas. To dislodge this idea and create a business-like sentiment in favor of a reasonable economy in the use of this fuel has been a difficult task.

The one thing that has brought the public to a proper realization of the truthfulness of the statements in the various reports from this office, to wit, that the supply of gas is limited, and that the best interests of all concerned demand a strict economy in its use, has been a short gas supply. That is one condition that has been very convincing, indeed, and I may say that it has been a condition that has been extremely impartial during the past year. When it comes, sentiment changes quickly. The cry then is to stop waste, quit extravagance and let the law be enforced.

By the waste heretofore referred to I have meant the escape of gas into the air at places other than at the point of consumption or the use of gas with no legitimate purpose in view. It must be plain now that a very large amount of gas has been wasted by these methods. As to the responsibility, it must rest largely with those to whom I have referred, who were seemingly wholly indifferent to it when, had they so chosen, they could have been a power to prevent it.

Among those to be counted directly responsible for the large and unreasonable waste that was permitted during the first two or three years of the history of the field, none were more active than land companies and "boomers," who desired to profit by the discovery of the new fuel. In 1886, when natural gas was discovered, that part of Indiana known as the "gas belt" was devoted almost exclusively to agriculture. Besides the customary flouring and saw mills, the factories were few and confined almost exclusively to woodenware. Manufacturers throughout the country were not slow to learn the advantages of natural gas as a manufacturing fuel. Factories located in other gas fields, where the supply had become limited, were first to seek locations. In a short time glass factories, tinplate mills, iron mills, and, in fact, all kinds of factories began to knock at the door
of the gas belt. The citizens of the gas belt were not long in realizing its possibilities as a manufacturing center, and began in a systematic way to locate factories. It was but a short time until a friendly rivalry sprang up between the various gas belt cities, each claiming to be the center of gas production, and the amount of the new fuel wasted to prove it can not be estimated. To locate factories, liberal subsidies were given. Propositions and counter-propositions were made by rival cities, and in nearly every case free gas was stipulated. Land companies were organized in nearly every city and town, and through their efforts many factories were located. At times the excitement ran high, and fabulous prices were paid for real estate. Free gas for factories was heard on every hand, and at places it seemed that the ingenuity of the "boomer" had been sorely taxed to contrive methods to advertise the gas field, which in every case involved waste, that the prospective manufacturer might see the enormous pressure and flow of the wells. These conditions under which the first factories were located are responsible to a large extent for the manner that these institutions treated the gas field in after years, for every one at all acquainted with the field and the factories located therein knows that most manufacturers, to say the least, have been very negligent regarding the manner of using this fuel. In many cases it came "free" and has been used in the same spirit.

WASTE OF GAS IN FACTORIES.

So far I have referred to the willful waste of gas only; that is, waste having no legitimate purpose. It is fair to say that this class of waste did not continue very long. There is another way in which an enormous amount of gas has been wasted and to which nearly every consumer has been a party. I refer to the gas wasted through extravagant consumption, and, I need not say, "has been wasted," for it is being wasted in that manner now.

Natural gas has fulfilled its highest mission when it has been used for the comfort and benefit of mankind. When it is burned under such conditions that its full heating power is not attained, there is waste and it has not fulfilled its mission. Of all consumers of this fuel, it would seem that manufacturers have reason to be most economical. This is not true, nor never has been. In some factories I have found the most crude appliances in use; appliances unscientific in every detail, and with which it was impossible to secure perfect combustion. A very slight expense and a little consideration of the principles of combustion would have saved fifty per cent. of the fuel.
In some factories these same conditions exist today, even where the factory is closed for lack of fuel. The presence of these conditions can not be charged, I think, to a positive desire to waste gas, but rather to negligence or a lack of knowledge of how to use it on the part of the parties having these matters in charge. There being no law governing the consumption of this fuel, the best that I have been able to do has been to advise. In this way some good has been done. Some manufacturers have responded cheerfully to suggestions, and have made an honest effort to treat their fuel supply in a business-like manner, but in a majority of cases promised improvements never come.

ENFORCEMENT OF THE FLAMBEAU LAW.

The question of light has presented many difficulties for manufacturers. Natural gas makes a very convenient light, but through lack of attention the ordinary light becomes very wasteful. For a number of years all factories were lighted with flambeaux. The average amount of gas consumed by one of these lights is 100 cubic feet per hour. This is certainly a very extravagant use, if not absolute waste. In line with this idea, the General Assembly of 1891 enacted a law prohibiting the use of these torches for illuminating purposes. This law encountered a silent, but determined, opposition from the first. Manufacturers, oil operators, drillers, farmers, and, in fact, every one who needed an outside light or a light where glass globes could not be used, resorted to natural gas torches. With all classes of people using these lights and a strong public sentiment against the enforcement of the law, it was not possible to do much. In some cases, juries refused to convict where there was no conflicting evidence, and many were the schemes resorted to by all classes of consumers to evade the law. As with other classes of waste, it was only when the diminution in the supply became noticeable that the law received the support of the public. At present the flambeau law is very generally observed, and a vigorous enforcement of the same is approved by nearly all. I speak of the co-operation of the public in the enforcement of the law, because I have found it almost impossible to enforce it as it should be without the sympathy of the public. It is doubtless noticeable that manufacturers and others who have been most active in condemning the waste of gas have, in some places, been most persistent in violating the flambeau law.

Most of the large factories in the gas belt have their own fuel supply plants. They control large tracts of gas territory; have planned
their pipe line systems and located their wells systematically. Such usually employ a superintendent of fuel supply and lines and everything used in the distribution and consumption of their fuel is kept in good condition. Those manufacturers, and there are quite a number, who have not planned for the future, who have drilled wells at the most convenient point, with no pipe line system in view, and only when it was absolutely necessary to have gas, usually give but little attention to waste. Neither wells nor pipe lines receive any attention so long as the supply of gas is sufficient, and when it fails the enormous waste of other people is proclaimed to the public.

**Waste of Natural Gas by Domestic Consumers.**

Manufacturers are not the only class of people that have wasted natural gas in this field. Much has been wasted by private consumers. In but few furnaces, stoves or grates is the combustion perfect, and it must be or more gas will be used than is necessary. Universally, in the past, and in most places at the present, natural gas is sold by the contract system, and where that system prevails, the incentive to economize in the use of this fuel is small. Imperfect combustion, overheating of houses and the absence of dampers in chimneys have been the cause of much waste. For many years after the discovery of natural gas, it is safe to say that 50 per cent. of the gas used by domestic consumers was wasted. I am sorry to say that practically the same conditions prevail today in localities where the supply of gas is sufficient, where there is gas to waste, and frequently where the supply is short one-half of the gas used is wasted.

I have devoted considerable space to the waste of gas during the early history of the field. And, as I have intimated, my purpose in so doing has been to make it plain, if possible, that all waste can not be charged to any one industry; that manufacturer, domestic consumer, drillers, and, in fact, all consumers of this fuel have in some degree contributed to the present condition. And I also want to emphasize the fact that I have no desire to excuse any industry for wasting this fuel. Some oil operators have been guilty of willful waste, and have been punished for it. While this is true, all the gas that has been wasted can not be charged to them.

**The Development of the Field.**

So far, I have referred to the past history of the field only as it relates to the use of its resources. The manner of the development of the field, and the ever varying conditions that each year has
brought forth, have been given in the annual reports from this office. Though it is not what the resources of the field have been, but what they are now that interests us, it is necessary that slight reference be made to some subjects that have been reviewed very fully in former reports that the present condition of the field be at all understood. The geological conditions in this part of the State, and the manner in which the field has been developed must be kept in mind.

The natural gas in this field is found in Trenton limestone, a universal formation in Indiana, but not a universal gas-producing rock. The fact that this formation is gas-producing over a comparatively small area, though underlying the entire State, is due to the textural and structural formation of the rock in this area. The gas is held in a porous stratum in the upper part of the limestone. This gas rock seldom reaches the surface of the limestone, and in some parts of the field it is less than five feet thick, while in other parts the drill has penetrated it 100 feet without reaching the lower surface. Both the lower and upper surfaces of the gas rock are very uneven, and especially is this true of the top, which has numerous ridges, with corresponding valleys.

The development of the field was natural, under the conditions. The first wells were drilled in the vicinity of cities and towns by companies organized to supply gas for domestic consumption. Soon "farmer companies" were supplying the rural districts, and natural gas was a universal domestic fuel throughout the field. Factories were supplied from wells nearby.

**Natural Gas Piped to Cities Outside of the Gas Field.**

Natural gas is too valuable a fuel to be kept within the boundaries of the field. From 1888 to 1892 pipe lines were constructed from the gas field to Indianapolis, Lebanon, Crawfordsville, Frankfort, Lafayette, Logansport, Peru, Wabash, Huntington, Bluffton, Fort Wayne, Decatur, Union City, Connersville, Richmond, Shelbyville and Chicago. Later, two lines were built from the eastern part of the field to Ohio, there, in addition to supplying a number of cities and towns, to supplement the rapidly diminishing supply of others that had formerly received an adequate supply from the field in the western part of that State. Prior to the construction of these pipe lines, there had been but little systematic drilling of wells and very little effort to pre-empt territory. Naturally, these lines, radiating in every direction from the gas belt, tapped it at the nearest point. Thus, an
outer zone surrounding the entire gas territory was first to be systematically drilled and to show signs of exhaustion. As the wells near the edge of the gas area became exhausted, or the rock pressure reduced below that of the pipe lines, it was necessary for these lines to be extended toward the center of production. As rapidly as has been necessary, the various pipe lines and lines tributary thereto have been extended, thus reducing the area of undeveloped territory. Then, as the wells supplying factories began to show signs of failure, the owners awakened to the true condition, and began to lease territory and plan for the future. Soon the entire gas field was either under lease or was controlled by land that was leased. Of course, there is some land that is not leased, and there is probably some under lease that will never be drilled, for gas companies sometimes lease land to keep other companies from interfering with their plans. But at this late day, the fact that a gas company has paid rentals on a large per cent. of the land in any particular locality for years does not deter other companies from invading this territory, if sufficient well sites can be secured. Scant courtesy is accorded any person or company in the location of wells now.

Effect of the Salt Water.

To understand the condition of this field, it is necessary that the effect of the salt water which is so universally present be understood. Introductory to this subject, I will quote parts of a paragraph from my first annual report (1895): “In order that petroleum and natural gas may accumulate in valuable quantities, it is not only necessary that a rock, the formation of which is suited to the storage of these products, be present, and that it be covered with an impervious roof, but it is equally necessary that the rock containing these hydrocarbons possess a structural relief sufficiently elevated to allow the various substances occupying the reservoir to arrange themselves in the order of their specific gravity, that is, the water, the oil (if any) and the gas on top. The required elevation of the relief is relative and not necessarily absolute. The productiveness of the reservoir seems to depend upon its elevation as related to the adjoining territory. The Cincinnati arch meets this requirement in the Indiana field. Its boundaries and structural peculiarities have been practically defined from the records of a number of wells drilled in the territory which it occupies. It is a low, broad elevation that crosses the eastern boundary of the State between Lawrenceburg and Liberty, and extends in a northwestern direction across the State. Its surface is very uneven in places, consisting of numerous small ridges or folds,
with occasional spurs extending at various angles from the main elevation. The presence of this arch supplies one of the very necessary conditions for gas yield in this State, for the reason that it acts as a trap in which the gas accumulates. In this arch or dome the gas is held under an enormous pressure, due to the weight of a column of water back of it. The Trenton limestone, which comes to the surface in New York and Pennsylvania on the east, Iowa and Wisconsin on the west, Kentucky on the south, and Michigan on the north, forms a large basin, in which the Cincinnati arch is located. The water entering at its outcrops flows towards its center and rises in the dome of the arch, driving the gas and oil before it until the resistance of these products is equal to the weight of the column of water. The cause of the pressure of the gas is plain."

Then, as the salt water is the force back of the gas, there is a constant conflict between the gas and water, and when the former is exhausted the latter will take its place in the rock. As the supply of gas diminishes, the salt water horizon advances toward the highest point in the reservoir. In some parts of the field it has seemingly been more aggressive than in others, which can probably be charged to the structural condition of the rock and the unequal draught on the various sections. In some parts of the field it appeared very early and overcame wells with a rock pressure of 260 pounds.

As the upper surface of the gas rock is undulating, it is plain that the salt water advancing meets it at the lowest points first, and thus, different localities of the field become hermetically sealed, one from the other. This condition is becoming more marked each year, and if the drill strikes a valley in the gas rock, a place where it is completely occupied with salt water, the certain result is known. Also, the per cent. of failures is becoming greater each year.

Generally speaking, the condition of a gas field must be judged from the condition of the wells; that is, the volume of flow, rock pressure, presence of salt water, etc., must be considered. During the early history of the field, and, in fact, until the salt water became such a prominent factor, the general conditions surrounding the field were easily determined. The salt water had not reached the top of the gas rock at any point, and the rock pressure of the entire field tended to equalize during periods of light draught. It was but necessary to test a few wells located in different parts of the field to ascertain the rock pressure of the entire area. While the volume of flow of the various wells was never uniform, owing to the difference in the textural condition of the rock, the failures were few, and most
wells were vigorous producers. With the changed conditions, a heavy draught on one section of the field may not affect localities nearby. Wells on adjoining farms frequently differ very materially in volume of flow, rock pressure, etc. It is plain, I think, that it is impossible to make anything like an accurate or satisfactory statement of the present condition of the field. In fact, the conditions are so varied and continually changing that it is not possible for me, being in the field all the time, to keep in touch with every section. I can only speak of conditions in a general way.

Present Condition of the Field.

In the brief review of the history of this gas field that I have given, it has been necessary to refer incidentally to present conditions, and in the special reference that I make to this subject I will avoid rehashing as much as is possible. In former reports I have referred to the "center of the field" and to "undeveloped territory," that is, that territory not invaded by pipe lines. While the center of the field, that section where the wells are uniformly most productive, remains at about the same locality, there is, strictly speaking, no undeveloped territory. That is, there is no territory that is not directly influenced by pipe lines. Practically the entire field is threaded with these lines, and there is but little room or excuse for further main line extensions. Of course, there are many, many small tracts of territory that have not been drilled in the usual systematic way, but future wells can be reached by lines tributary to the main lines now laid.

As the volume of the wells has been decreasing, the number of wells drilled yearly has been increasing, and the past year has been no exception. There was a time when there was but little drilling during the winter season; now the drill is busy in most localities the year around. As virgin territory has become scarcer, and wells drilled therein less productive, the tendency is to redrill old territory. Usually, wells located in territory that has been drawn upon for a considerable time are small producers and comparatively short-lived, but most of them can be used with little pipe line expense. One of the very noticeable conditions at the present time is that wells, without regard to where they are located, are very sensitive to a continued heavy draught. When first drilled, they seem vigorous, and usually show a creditable production, but the resources of the gas rock are so limited that they fail to honor even a moderate continuous heavy draught. They are easily overworked.
The decrease in the rock pressure of the field has been very marked during the past year. It must be understood, as has been stated frequently in former reports, that while a decrease in the rock pressure of a given area of the gas field indicates a general diminution in the supply of gas in that area, that rock pressure is not an index of the capacity of a well, and as the supply of gas becomes more nearly exhausted, its relation to the same usually decreases. The velocity of the gas at the well mouth is the only true index of the capacity of a well; but, as it is not possible for me to secure this information from every well in the field, or even a majority, reference is made to the rock pressure. As I have said, this shows the general drift of conditions. For reasons that have been stated, it is much more difficult to gain any information along this line than formerly, for it is necessary to ascertain the pressure of numerous wells in the various sections of the field to obtain any information at all.

In taking rock pressures this year, I have not considered those small areas of gas territory located on the edge of the field that have been explored for the first time this year. Some of this territory has been held under lease for a number of years, and abandoned as worthless, and then taken up by another company and developed with profit, as the territory south of Middletown, Henry County, now being drilled by the Richmond Natural Gas Company. Another instance is the territory north of Marion, Grant County. This territory had been given but little consideration by any one, and was considered very light gas territory, if not worthless. During the past year, while being explored for oil, a number of productive gas wells were drilled. It is from this territory that Marion is supplying a large per cent. of her domestic consumers. Though some of the wells, on account of the large amount of salt water present, show sign of early decline, the rock pressure when the first well was drilled was 240 pounds. It is these exceptional cases of high pressure that have not been considered in computing the average rock pressure of the field.

The initial rock pressure of the Indiana gas field was 325 pounds. January, 1896, the average of the field was 230 pounds. This had decreased to 115 pounds in January, 1901, an annual decrease of 23 pounds. As near as I can ascertain, the average rock pressure of the field now is 80 pounds. The lowest pressure found was 30 pounds, and the highest was 120 pounds.
With the decrease in the rock pressure in this field came the necessity for using compressors on pipe lines. Quoting from my last annual report, I say that the pressure required to transport natural gas depends primarily upon the consumption. With no consumption and the pipe line perfectly tight, the pressure at the outlet of the line must be the same as at the wells, and with the line wide open at the point of consumption the loss of pressure is at a maximum. The amount of natural gas that can be transported in any pipe line a given distance depends upon the size of the line and the pressure in the same, the former governing the volume of gas and the latter the velocity. Thus, as the field pressure decreases, the question presented to both gas companies and manufacturers is, whether to build compressing stations or increase their pipe line capacity. Some have adopted the former, others the latter, while occasionally it has been necessary to resort to both.

The law prohibits the transportation of natural gas through pipe lines at a pressure exceeding 300 pounds. With the present conditions in the field it is doubtless impossible to maintain the maximum pressure allowed by law. However, I have taken the precaution to test the pressure in all lines where it would seem that an excessive pressure would be desirable, or even possible, and have not found an unlawful pressure in a single line:

The following companies have stations as indicated below in this field:

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<th>Company</th>
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<td>2. Consumers' Gas Trust Company, Indianapolis</td>
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<td>3. Manufacturers' Natural Gas Company, Indianapolis</td>
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<tr>
<td>4. Indiana Natural and Illuminating Gas Company, Lebanon, Frankfort and Crawfordsville</td>
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<td>5. Lafayette Gas Company, Lafayette</td>
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<td>6. Logansport and Wabash Valley Gas Company, Logansport, Peru, Wabash and Decatur</td>
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<td>7. Fort Wayne Gas Company, Fort Wayne, Bluffton and Anderson</td>
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<td>8. Portland Natural Gas and Oil Company, Portland</td>
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<td>9. The Ohio and Indiana Consolidated Natural and Illuminating Gas Company, Lima, Ohio</td>
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<td>10. The Redkey Transportation Company, Dayton, Ohio</td>
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<td>11. Richmond Natural Gas Company, Richmond</td>
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<tr>
<td>12. Indiana Natural Gas and Oil Company, Kokomo, Ind., and Chicago, Ill.</td>
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<td>13. Muncie Glass Company, Muncie</td>
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THE WASTE OF GAS DURING THE PAST YEAR.

In a former section of this report I referred to the waste of natural gas during the early history of the field. My desire is that, at this time, when so much is being said about the waste of gas, that it be understood by every one that during the early history of the field this enormous reservoir of gas, with its 325 pounds’ pressure was opened into the air for weeks at a time, just to show to the world what an inexhaustible supply of natural gas Indiana possessed, and that much of this valuable fuel has been wasted through the extravagant use of it that has characterized this field from the beginning. At this time, when the evidences of final exhaustion are so plentiful, manufacturers and others who are experiencing a shortage in fuel for the first time, and are brought face to face with a subject to which they have given but little attention in the past, are inclined to charge present conditions to the oil operator, who is encroaching upon the gas field. If the blame is to rest there, those who contributed so much during years past to bring about this condition are not brought to account, nor is the extravagant consumer. The tendency is to charge the responsibility to those who may be caught wasting gas now. Natural gas is one of the most valuable resources of the State, and any one who deliberately wastes it at any time is not acting in accord with the best interests of the commonwealth.

The avenues through which natural gas may be wasted from the well to the consumer are many, and it requires constant watchfulness to prevent it. I am pleased to say that at present the necessary precautions to prevent waste from these sources are generally observed. Under ordinary circumstances there is but little gas wasted at the well while it is drilling, and in most localities the pressure is low in the lines, and there is comparatively little waste.

The manner of consuming natural gas, especially by the private consumer, has not improved much. While there has been less gas
used during the past year than formerly, it can be charged to a short supply rather than to economy in using it. It is seldom that a fire is found in either private house or factory where the combustion is perfect, where all the gas is consumed under proper conditions, and the heat placed where it belongs. Incomplete combustion involves waste and fails to give the most satisfactory service, though the supply of gas is ample. It is admitted that the prevailing method of selling natural gas, the “contract system,” is largely responsible for the indifference manifested by the average consumer regarding methods of consumption and the amount of gas consumed. By the terms of the contract, the charges are the same regardless of the amount of gas consumed. It is unfair to both parties. Where the supply is short, the consumer may pay for gas that he does not use. The system is wrong, and would not be tolerated in any other business. The only just method of selling gas is the one under which I am compelled to pay for the gas I consume and no more. The introduction of meters at this late day would improve the service in most localities, if it did not materially prolong the life of the field. Where the benefit is to the consumer, economical appliances are usually introduced. With perfect combustion less gas is necessary. Where the supply is apparently short, the trouble in most cases is with the manner of using gas, rather than with the service.

Of all classes of natural gas consumers, the manufacturer is certainly the one that would be least expected to use it extravagantly, much less permit it to be wasted; yet, in many instances, I have found both conditions existing. As a business proposition it would seem that a factory, the life of which depends upon this fuel, would practice as rigid economy in its consumption as is observed in the use of the other constituents of the factory product. It is difficult for manufacturers who have been victims of a “free gas” subsidy to realize the necessity of a business-like economy in the use of their fuel until they have been brought face to face with a short gas supply, and then the disposition is to increase the supply of gas, if possible, rather than adopt economical appliances and change methods of consumption, which, in most cases, would effect the same purpose and be less expensive. Of course, these statements do not apply to all manufacturers, but to a majority.

Notwithstanding what has been said regarding the use of natural gas in factories, I am pleased to note that there has been a very noticeable change during the past year, partly due to the scarcity of gas and partly to the law which has been as rigidly enforced as was possible with the field force at my command.
THE WASTE OF GAS BY OIL OPERATORS.

In what has been said about the waste of natural gas but little reference has been made to the oil field, not because it does not merit it, but because I have thought it proper to call especial attention to it in the proper connection. More complaints have come to this office the past year regarding the waste of gas by oil operators than any previous year. By many people, the oil industry is considered a most dangerous enemy to the natural gas field. The reason for this rests primarily in the fact that where gas and oil are found in the same rock, it is difficult to produce the oil without wasting the gas, inasmuch as only a limited pressure can be held in an oil well without materially reducing the production; and, in the further fact that a few oil men have shown a bitter opposition to the laws enacted to preserve the gas, and have seemingly taxed their ingenuity to invent ways to evade the provisions of the same. I am pleased to say, however, that the class of oil operators mentioned above are greatly in the minority, for many are in positive sympathy with every effort to enforce the law, and a large majority are making an honest effort to obey its provisions. I could not say as much one year ago. Previous to the past year, drilling for oil was principally by oil companies, many of which had but little respect for the natural gas industry. During the past year much of the new oil territory developed has been by manufacturers and others interested in protecting the natural gas supply, and who were prepared to care for any surplus gas.

While it is not within the scope of this report to give a detailed description of the oil territory in Indiana, it is proper to refer to it in a general way in this connection. What is generally known as the Indiana oil field is located on the northeastern border of the gas territory, and embraces parts of Adams, Jay, Wells, Huntington, Blackford and Grant counties. This is distinctively oil territory, and in most wells there is not enough gas for fuel purposes, pipe lines from the main field being necessary to supply fuel for drilling and pumping purposes. The territory in Blackford and Grant counties referred to above embraces the north one-half of the former and Van Buren Township in the latter.

The past year has witnessed a great change in this part of the field. In Blackford County the oil territory now extends south of Hartford City, and in Grant County some of the most profitable oil territory is in Monroe, Mill, Franklin and Center townships. In Madison County comparatively few oil wells have been drilled since
my last report, there being fewer than 100 oil wells in the county. Under ordinary conditions about one-half of these are being operated. A very small per cent. of these show more gas than is necessary to operate them. Those showing the most gas are owned and operated by gas companies that have never spared any trouble or expense to protect the gas supply. A few profitable oil wells have been drilled in Monroe Township, Randolph County, and Liberty Township, Delaware County.

Referring to all of the new territory that has been developed for oil during the past year, it may be said that it has been gas territory; that is, nearly all of the wells produce some gas, and a number gas only, and in profitable quantities. True, some of this territory had been condemned for gas years ago by both manufacturers and gas companies, but that was at a time when more productive territory was available. If the large number of wells that have been drilled, especially in Grant County, are taken into consideration, the difficulties that I have experienced in protecting the natural gas interests the past year will be plain. It is altogether probable that there have been many violations of law in both the gas and oil field that have not been detected by this office. What law is there that is not violated? There are laws prohibiting murder, theft, drunkenness, etc., and yet men are murdered, theft is not uncommon, and men continue to drink to excess. Of course, wherever there is natural gas there is danger of waste through accidents or negligence, if nothing else, but that part of the original gas area where there are most wells being drilled, where the pressure is highest and the opportunity to waste gas is greatest, contains about 1,000 square miles. Is it possible for two men to keep in touch with all parts of this territory and prevent the waste of gas if there is a disposition so to do on the part of those operating? I have employed my time diligently, and have done everything possible to preserve the natural gas supply, and when I have done this I have done my duty.

The fact that many factories have experienced a shortage in their supply of gas during the past year, and this has been true whether the factory was located in the oil field or not, and the further fact that there has been considerable drilling for oil in territory upon which these factories were depending for their fuel supply, accounts in no small degree for the complaints from manufacturers regarding the waste of gas. It is true that in some cases there has been just cause for complaint, but in many cases the complaint was the offspring of an imagination quickened by a short fuel supply. No complaints have come to this office that have not been thoroughly and
honestly investigated, and where the facts have warranted it, vigorous prosecutions followed. During the year I have filed 49 affidavits charging a violation of the gas-waste law. A majority of the cases have been tried and a conviction secured in all except two.

**CONCLUSION.**

There was a time when the regulation questions in the gas field were: Is the gas failing? How long will it last? But little interest attaches to the former question now, for there are but few consumers, indeed, that do not know from actual observation and experience that the supply is rapidly being exhausted. Chief interest at this time centers around the latter question: How long will natural gas last? I can not answer this question. Who can? We can say positively that the time when natural gas has ceased to be a universal domestic and manufacturing fuel within the gas field is here. The end will be gradual, and the beginning is here. If, after using this fuel for 16 years, a change to other fuels is necessary, it is well that we have been forewarned, that the decline has been gradual, where it is possible to use other fuels, the manufacturer has had time to prepare for the change. A few factories have closed on account of the short gas supply this year. Others have been compelled to shut down during the extreme cold weather or have used coal to supplement the supply of gas. At least three of the principal factories in the gas belt are preparing to manufacture gas.

The time is here when all classes of consumers should prepare to supplement the supply of natural gas during extreme cold weather with other fuel. To insure comfort this is a precaution that should not be neglected.