ANNUAL REPORT OF THE STATE NATURAL GAS SUPERVISOR.

OFFICE OF STATE NATURAL GAS SUPERVISOR,
MARION, IND., January 11, 1904.

Prof. W. S. Blatchley, State Geologist:

Sir—I submit to you herewith my First Annual Report, the same being the twelfth annual report from this office. I began the duties of the office March 16, 1903, which is the time in the year when the field is demanding most attention. Since that time, for reasons fully explained in the body of the report, it has not been possible for me to give much time to either collecting material for a report or compiling it. I have given briefly the transactions of the office for the past year and such data regarding the condition of the field as should be interesting to those interested in the natural gas industry.

Permit me to thank you at this time for the very cordial support that I have received from you at all times.

I respectfully submit this report.

Yours sincerely,

BRYCE A. KINNEY,
State Natural Gas Supervisor.

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In 1891, a little more than four years after natural gas was discovered in this part of Indiana, a law was enacted by the Legislature then in session, creating the office of State Natural Gas Supervisor and defining his duties. As will be noticed below, these are certainly numerous enough to satisfy the most industrious. Of course, the law should not be criticised, because it does not conform to the conditions at present, for when it was enacted the general conditions in the field were not only very different, but the public idea regarding the generation, storage and life of natural gas has suffered a radical change. Former reports from this office have noted the exact conditions in the field from year to year and the changes, and these will not receive more than passing notice here.

Under the law it is the duty of the State Natural Gas Supervisor to make a personal inspection of all the gas wells of the State so far as it is practical and to see that every precaution is taken to insure the health and safety of workmen engaged in opening gas wells and laying mains and pipes, and of those who, in any manner, use natural gas for mechanical, manufacturing, domestic or other purposes. Here have been given probably one-fifth of the duties assigned to the Supervisor, and with the aid of the one assistant allowed him and by working every week in the year he could doubtless do this work. I inspect all the wells possible while attending to more important duties, at least enough in the various sections of the field to give me a correct idea of the condition of the gas supply. As to the looking after the safety of workmen engaged in the gas industry, I have given it no time, because there is no use of it at this time. Contractors, gas companies and manufacturers employ the most skillful workmen possible, men who thoroughly understand the dangers attending

the handling of natural gas. These are the conditions now. Doubtless they were different early in the history of the field.

In addition to the above it is the duty of the Natural Gas Supervisor to collect and tabulate in his annual report to the State Geologist the following facts: The number of gas wells in the State, with their location and a record of the geological strata passed through in drilling them; the depth at which salt water is reached in the various wells and the height to which it rises; the volume of gas produced by each well so far as it can be ascertained, and also the rock pressure of the various wells; the increase or decrease in the rock pressure and volume of flow of the various wells of the State; the number of miles of mains laid for the transportation of natural gas and the capacity and cost of the same; the amount of capital invested in the gas industry and the number of persons employed in the same; the cost of natural gas for fuel in the various cities and towns in the gas belt, and in addition, a large amount of data regarding the manufacturing industry in the gas field that alone would require the time of one man to collect and tabulate. Much of the information required above is collected and published by the Bureau of Statistics. Nor is this all; according to law it is the duty of this office to inspect all the pipe-lines in the State once each year or as often as the State Geologist may direct. This is a work that is necessary in part only. Most of the larger gas companies look after their lines very carefully. They have no gas to waste. Men are employed to go over the lines at regular intervals. It is a waste of time for the Supervisor to inspect these lines. Of course, as would be expected, there are a number of gas companies that pay but little attention to their field lines and these should have the attention of the Supervisor frequently.

In addition to the numerous duties enumerated above, the Natural Gas Supervisor must see that all the laws of the State pertaining to the drilling of wells and the piping and consumption of natural gas are enforced. This is the most important duty charged to this office at this time. During the early history of the field, the public in general was opposed to the enforcement of the laws that had been enacted to husband the gas. As has been stated many times in the reports from this office, the majority of the consumers of gas, both in the field and in the pipe line cities,

thought, and honestly too, that the supply of gas would last forever, and that no just reason could be given for laws to prevent waste. The conditions have forced a change in public opinion. Questions regarding the generation, storage and pressure of natural gas are given but little attention now. It is admitted everywhere that the supply in this field is about exhausted. What are the most effective measures to adopt to save what is left that it may be utilized as its value warrants? To the minds of most people in the gas field, the only duty of the Natural Gas Supervisor at this time is to enforce the laws regarding the waste of gas.

Comparatively little was known regarding the natural gas industry when the laws to regulate the use of this fuel were enacted. Enough territory had been developed to show the approximate area of the field, though it was some time before the gas area was definitely defined, if it ever has been. To the consumer who knows nothing of gas except what he sees at the point of consumption, the supply seems inexhaustible. It has been a very difficult task to convince the consumers of this fuel that the supply would not last forever.

Regarding the purpose of the annual reports from this office, it is plain that they are to make public the resources and limitations of the gas field. This I shall endeavor to do, though it must not be forgotten that the work of the office has changed as the conditions in the field have. For the first five years of the history of the field there were no laws to enforce, and if there had been it would have been a difficult task, as it always is, to enforce a law against public opinion. At that time, the time of the Supervisor could be given to the statistics required in the report. As the field progressed and evidences of a decline in the supply became plain, laws were enacted to husband it, and as the consumers of this fuel became educated as to the true conditions in the field, more of the Supervisor's time was demanded in the enforcement of the law. Since I have had charge of the office I have devoted all of my time to the enforcement of the law prohibiting the waste of gas. Incidental to the other work I have been able to collect the data and statistics given in this report. The citizens of the gas belt and the consumers of natural gas in general do not seem to be concerned very much at present about the condition of the

field. It is understood and acknowledged by all that the supply is fast declining and that the end can not be far off.

The changed fuel conditions in the gas belt and other places in the State where natural gas is used has been accepted in a common-sense way by the average natural gas consumer, and where other fuels have not already been adopted arrangements are being made to change. As I have stated, what is demanded now by those interested in the gas industry as well as the consumer, and that in no uncertain tone, is the strict enforcement of the law prohibiting waste. And, since I have not been able to do all of the work stipulated by law, I have endeavored to do that which seems to me is of most importance to the natural gas interests under present conditions.

THE CONDITION OF THE GAS FIELD.

To make an intelligent report of the condition of this field at this time is indeed a difficult task. It is difficult for any one that has not visited the field to understand the varied conditions that exist at this time. And, not only are they varied but they are constantly changing. During the early history of the field they were fairly uniform. To gain an idea of the condition of the entire field it was but necessary to examine one or two sections. To gain any conception at all of the gas field at this time, and the supply of gas, it is not only necessary to visit and examine every section of the field, but it is equally necessary to understand the general character and location of the gas rock. In this field the Trenton limestone is referred to as the gas rock, but, as a matter of fact, only a small part of the Trenton limestone is gas rock. The gas rock is that part of the Trenton limestone that has the textural condition necessary to a gas reservoir; that is, that is porous. It neither comes to the top nor extends to the bottom of the Trenton formation. It is usually found from one to fifteen feet from the upper surface of the Trenton rock and is from one to fifty feet thick. In a few instances it has been found thicker than this, but there is seldom over fifty feet of continuous gas rock. Both surfaces of this rock are very uneven, as the records of many deep wells testify. At no place has the surface of this rock been found level for any considerable distance, and a relief

map of the upper surface would show many hills and valleys, elevations and depressions. As I have stated before, the early history of the field showed similar conditions throughout the entire gas area which remained until the salt water advancing met the lower portions of the overlying strata of hard limestone, completely occupying the gas rock at the lowest points. Thus it is seen how the high places in the gas rock have become sealed one from the other as the stock of gas has been consumed and the salt water has advanced. It is also plain why gas wells on the same farm frequently differ so greatly in rock pressure and volume. Each taps a different reservoir. The conditions stated above are substantially the conditions in this field at this time. Instead of there being one gas reservoir as there was for many years, there are numerous small reservoirs, each completely sealed in by the salt water. The same force that governed the pressure at the beginning governs it now, except that the presence of the salt water did not have to be considered at first as it does at present. The life of the gas in each independent gas-holder depends upon the size of the elevation, the porosity of the gas rock and the consumption as it did with the larger reservoir. It is but reasonable to believe that as the supply of gas diminishes and the salt water advances that the reservoirs from which we are drawing gas now will be divided and subdivided into smaller reservoirs until the supply is entirely exhausted. If the drill strikes the center of one of these small reservoirs or elevations in the gas rock a "gusher" is frequently reported, though it may cease to be a profitable producer in a very short time, and, on the contrary, if the drill strikes a low place in the gas rock the result is evident. From the statements above the reason for the great difference in the life, rock pressure and volume of gas produced by wells located in the same section of the field is plain. Frequently wells located on the same farm vary much in rock pressure and volume of flow. One may continue to produce gas in commercially valuable quantities for a year, while another one-half mile away may succumb to the salt water in one week. There is one element in the gas field with which the gas industry has to contend which has not been mentioned. I have reference to the oil industry. The progress of the same and the part it has played in shaping the history of the gas industry will be noted in another chapter of this report.

In many respects the year just past has been peculiar and much unlike previous years in natural gas history. To understand this a brief reference must be made to the history of the development of the field. For the first three or four years after the field was discovered there was but little systematic drilling. Wells were drilled where they were needed. No heed was paid to waste, and the surplus energy of nearly every city and town in the gas territory was expended in trying to get some one to use the gas. It was not long until pipe-line companies entered the field, and then the drilling and general development of the field by all classes of consumers became somewhat systematic, and remained so until the entire field, north, south, east and west, was tied together with pipe-lines. Pipe-line companies, local gas companies and manufacturers very soon learned the necessity of leasing territory to hold in reserve for future drilling and of planning their field of operations. Sometimes this was a difficult task, as conflicting interests tried to pre-empt the same territory. Plans had to be changed to meet unforeseen conditions. Some of the larger gas companies by extending their lines showed a disposition to control the entire gas area. This was a failure, as the highways can not be pre-empted, and wherever a gas company can obtain a right of way for a pipe-line sufficient well sites can be obtained without serious trouble. However, conflicting interests have usually been adjusted without much difficulty. From the beginning, pipe-lines have been extended year after year toward what was considered the center of the field. Where it was possible wells were usually drilled one-half mile apart, though the distance between wells was never uniform. Frequently small areas contiguous to pipe-lines were left undrilled. This continued until the field was developed, that is, developed according to the plan I have described. When this was done there was nothing left for gas companies to do but to redrill the territory. This is being done. With but few exceptions all the drilling done this year is on locations between old wells, many of which had been abandoned years ago. The average well drilled now would have been considered a failure ten years ago. The per cent. of failures are growing larger each year, and where gas is found the volume of flow is seldom above 500,000 and frequently below this. The drilling this year has been much different from former years because there is absolutely

no system in it; that is to say, locations are not drilled in regular order. Gas companies drill in one section of their territory and then another, wherever the indications for gas are best. Wherever the rock is found high the salt water is not liable to be so bothersome. While, as I have said, the wells obtained now are very small they are, nevertheless, profitable. The iron is usually from old wells and the cost is frequently not much more than the drilling. Then, gas is sold for five times what it was ten years ago. Another incentive to continue drilling, though the wells are small, is the oil prospects. Much of the gas territory is showing oil, and where gas is not found in profitable quantities the well is not always a loss.

There has been a very radical change in the method of selling gas throughout the field this year. Within a comparatively short time after gas was discovered every city and town of any consequence was piped for gas. In a few cities "wide open" franchises were granted allowing the gas company to regulate the price for all time. In most cases, however, the danger of this was foreseen, and a limit to the rates to be charged was inserted in the franchise. At first and for a number of years gas was sold at "flat rates" both in the gas territory and in pipe-line cities with one or two exceptions. The price varied from fifty cents to one dollar and fifty cents per stove. The gas companies prospered at these rates for a number of years. As the supply of gas decreased and the wells became less productive; as the rock pressure decreased and the pipe-line had to be extended each year and compressing stations added, the gas companies began to demand higher rates. This was refused at first in most instances, and the result has been numerous controversies between the representatives of the people and the gas companies. In some places the rates have remained the same until this year, and then they were advanced only when the gas company absolutely refused to supply gas longer at the old rate. At present gas is sold in all of the larger pipe-line and gas-belt cities, except Indianapolis, and there is but little sold there, by meter. On account of the scarcity and high price it is not a universal domestic fuel at present, and of course it never will be again. It is generally used as a cooking fuel where the supply is sufficient.

But little new pipe-line has been laid this year. More line was taken out of the ground than was put in it, and especially is this true of the larger lines. The Indianapolis Gas Company and the Manufacturers' Gas Company of Indianapolis, both supplying gas to Indianapolis for domestic and manufacturing purposes, have quit supplying gas to that city and have taken up their lines to the field. A number of smaller lines have been abandoned. A large amount of pipe-line of all sizes belonging to manufacturers who have either left the gas field on account of fuel or have been compelled to change to other fuels is not being used and will probably be taken up soon.

Abandoned Territory.

On account of the scarcity of gas in some sections of the State, wells have been drilled in territory that has been abandoned for a number of years. In a few instances these efforts have been to a certain degree successful. Usually small companies have been organized to supply gas to the stockholders only. In one city of the gas belt at least twenty-five wells have been drilled within the corporate limits of the city within the year just past. About three-fourths of these produced a little gas at first, enough to supply from five to fifteen families. About one-fourth of them are producing a small amount of gas at present. In but few instances have these wells proven to be satisfactory investments. I have never advised drilling in such territory. Wells drilled in territory that was overrun with salt water five or ten years ago are sure to meet an early death. There is no provision for the renewal of the supply of gas, and when the territory is exhausted that is the end. Notwithstanding, however, the discouragements in this territory, it is probable that much of the field will be redrilled. After using gas for fifteen years, the people in the gas belt dislike very much to give it up as a fuel and will exert every effort to prolong the supply. What deceives so many interested in these company wells is the rock pressure. The wells that are drilled now in this territory that was abandoned ten years ago show near the same rock pressure that the territory did when it was abandoned. Those that are interested in these wells judge them by the rock pressure, which is never in any case an index

of the capacity of the well. The open flow pressure is an index of the volume of the well and that alone.

New Territory.

History shows that the development of the Indiana natural gas field was along natural and rational lines. It is easily understood. Soon after the discovery of gas, pipe-lines from six to twelve inches in diameter, radiating in every direction from the gas reservoir, transported the gas to cities and towns beyond the gas area. Consumers 140 miles from the main gas field were permitted to enjoy this gaseous fuel. Naturally, as the edge of the field where these lines first tapped it began to show signs of exhaustion, the lines were extended toward what was thought to be the center of the field. Seldom was any territory completely developed as fast as the lines were laid. Not only were many well sites left but an occasional area of considerable acreage that seemed comparatively unproductive at that time in the history of the field was passed. By way of explanation it might be said that the productiveness or capacity of a gas well is governed by the porosity of the gas rock. If the rock is very porous and the gas passes rapidly from the gas rock to the well bore, the well will be very productive. On the contrary, if the gas rock is hard and contains but few pores or interstices in which the gas may be held, it will pass very slowly from the surrounding gas rock to the well bore and the well will be less productive. The latter is the condition found in the unproductive area referred to above. It may be said, however, to the credit of this rock, that as a usual thing the wells remain productive longer than they do in the more productive rock. In this connection I will repeat, that this undrilled territory just referred to is supplying most of the well sites this year. Wells are located, if possible, near pipe-lines and as close as possible to the point of consumption, either between wells once productive or in territory that was labeled unproductive years ago. The territory referred to above is usually spoken of as new in the gas field, but it is not so considered in this report. New gas territory is that which has never been drilled or tested in any way until the present time. Such is the territory in the northern part of Grant County and the southern parts of Wabash and Hunt-

ington counties. Quite a large area of fairly productive territory has been developed in that section this year. Some of the wells started with a very large production, and a showing of oil is found in some places. Over one hundred wells have been drilled in that section, and three years ago it was considered entirely out of the gas belt. Huntington, Wabash and Marion are supplied largely from this field this year. This new field, though small, is completely separated from the main gas area, either by salt water or a section of hard nonporous rock, probably the latter. The rock pressure varies from 230 to 280 pounds. The gas rock is very irregular in thickness and porosity. A few "dusters" are to its credit. How long it will continue to supply the present draught I can not say, though every indication is that it will be much shorter lived than the field south.

Since gas became so scarce, it is but natural that considerable "wildcatting" around the edge of the field should be done. Cities are piped for natural gas and all of the appliances for regulating and distributing the same are in place. The consumer has the necessary pipes and heating appliances. Even if other fuels were as desirable as gas, a change would mean a large immediate expense. Under these conditions, gas companies can get any reasonable price for the gas as long as it does not cost more than other fuels. A number of fairly productive wells have been drilled near the extreme northwest edge of the field this year, the product of which is being taken to Wabash and Peru. So far as I know all of the gas companies of the State that are pretending to supply gas are doing their best to give good service, though it is true that some have fallen far short this year even with the limited consumption. In some sections gas companies have expended large sums of money in their efforts to secure an adequate supply of gas, and have failed. In most instances discouragements have been met with renewed determination, and because of this more than one city has enjoyed the privilege of using gas one more year.

About seven years ago a strong flow of gas was found near Petersburg, Pike County. The second well was a failure. A second producer has been recently found. Gas has been used in that city for domestic and manufacturing purposes since the first well was drilled. The flow of the wells and the pressure remain strong considering the consumption. The find at Petersburg stimulated

the desire to find gas in that section of the State. Much money has been spent and many wells drilled without much success except at Loogootee, Martin County, and Princeton, Gibson County. At the former, gas was found at a depth of about 500 feet, four years ago. Twelve wells have been drilled a short distance west of the city. All are good producers and show a pressure after four years' use of 125 pounds. The field is small and efforts to enlarge it have not been successful. Some oil is found. At Princeton but little gas has been found, not enough to be commercially valuable. The oil prospects are bright at this time.

There has been some drilling for gas in Allen County the past year with a show of success, but not enough gas has been found to attract much attention.

The Consumption of Gas.

The consumption of natural gas both in the field and in pipeline cities has decreased more during the past year than any previous year in the history of the field. To a person who has watched the progress of the field from the beginning it seems that the year 1903 has been a year of changes. More people have changed from natural gas to coal and wood than any previous year, and in the matter of rates the change has been almost universal. Gas is very generally sold in the larger cities by meter measurement, and the change from the flat rate system has, in most cases, been made this year. To benefit by the meter, economical appliances must be used and, since the future of gas is so doubtful, many people have declined to purchase new appliances and are using gas for cooking only. Thus, the use of natural gas for domestic purposes has decreased at least fifty per cent. during the past year.

It is very difficult to say how much gas is used for manufacturing purposes or to compare the amount used now with the amount used when gas was plenty and factories used all they could and wasted nearly as much as they used. Some gas is used by some factories, and none that I know of have enough. One thing is certain, all the gas belt factories are not going to leave this part of the State when the gas is entirely exhausted. The indications now are that but few factories will leave the gas field. Some of the smaller glass factories that have but little invested

in buildings and machinery will probably either quit the business or rebuild near a supply of fuel. Some of the largest and most substantial factories in the field have quit using gas and are seemingly doing a profitable business, using coal. Others are shut down a part of the time on account of the shortage of gas, while a majority are supplementing the limited supply of gas with other fuels. Present indications are that but little gas will be used for manufacturing purposes another year. The first city to abandon the use of natural gas entirely is Logansport.

The Waste of Gas.

It is hardly possible to say anything about this subject without rehashing what has been said in former reports, for it has been given more space than any other subject for several years. It has been and is a subject of most vital importance to the gas interests of the State. There never has been a moment since this fuel was discovered that it has not been wasted in various ways in every section of the field. After about five years the Legislature of the State took notice of this waste and enacted laws prohibiting the use of natural gas in flambeau lights and the escape of gas and oil from pipe-lines. Every person at all acquainted with the history of the field knows of the large amount of gas that has been wasted by the use of the large gas torches that were allowed to burn night and day, year in and year out. The enforcement of the law prohibiting these lights encountered much opposition at first which was caused largely by the idea that was generally entertained at that time, that the stock of gas was being renewed daily and could not be exhausted, regardless of the amount used or wasted. Of course, as usual, it was contended that the law was unconstitutional. In 1896, the Supreme Court of the State rendered a decision holding the law constitutional. About this time the gas began to show signs of failure and this, with the decision of the Court, has rendered the work of enforcing the law comparatively easy. The only trouble that I have had is to get the necessary evidence to convict the person who uses or lights the light. My attention is called more often to the lights used by drillers and oil well pumpers than any other class of people. Natural gas makes the most convenient light that either can use, and there

would be no objection to its use if it was not wasted. Most of the waste can be charged to carelessness. Imperfect fittings and burners are used and more lights are used than are necessary. I have found the most economical outdoor light to be a jumbo tip enclosed in a perforated iron globe. While these do not, strictly speaking, conform to law, they consume less gas than the lawful light. There have been twenty arrests made by this office during the year for the violation of the flambeau law. Twenty-one affidavits were filed by an officer at Upland not connected with this office against persons using natural gas torches, with four convictions.

Prior to the discovery of oil in the main gas area but little gas was permitted to escape from wells. The amount of gas that has been wasted to test the gas field for oil and to produce oil can not be even estimated. It would probably be a little extravagant to say that as much has been wasted as has been used, but an enormous amount has been wasted, as every person will testify who witnessed the oil excitement in the vicinity of Alexandria, Madison County, in 1897. The records show that over fifty wells, producing from one to five million cubic feet of gas daily, remained open for six months. These wells were closed after the Supreme Court of the United States had declared the law constitutional. From that time until recently there has been a struggle between the oil and gas interests. It has been impossible, even if desirable, to stop the development of the oil industry in the gas field. Oil can not be produced in high-pressure gas territory without wasting some gas. However, the gas pressure has gone to a point now where oil can be produced if the proper precautions are taken, without wasting gas. Most cases of waste that I have found this year could be charged to negligence on the part of the pumper. In fact, in the most productive parts of the oil territory, gas is so scarce that the oil operator is more interested in husbanding it than any one else. There are many places in the oil field where there is not enough gas for fuel for drilling and pumping. While it is not possible for one assistant and myself to be every place at the same time or to visit any one place very often, yet I have learned the sections where the disposition to waste the gas seems most pronounced and have, I think, reduced the cases of wilful waste to a minimum. As the field pressure

decreases, the pressure in the lines becomes less, and with a low-line pressure there is absolutely no excuse for wasting gas anywhere in the field. The surplus gas can always be put in a line at a fair compensation.

Where there is any effort made to keep field lines in repair there is but little waste now, and as the line pressure decreases the waste from this source becomes less. Of course, as long as there is any gas in the lines there will be some waste, and it can only be kept at a minimum by constant attention on the part of the owner. I have endeavored to enforce the law prohibiting the waste of gas from pipe-lines, and believe that I have done effective work along this line this year.

Plugging of Abandoned Gas and Oil Wells.

Without criticising my predecessor in office in the least, I can say that previous to this year there was but little done to enforce the law regarding the plugging of abandoned gas and oil wells. Both the condition of the field and the reports of the Natural Gas Supervisor show that the subject has needed attention, and doubtless it would have received it had not the law been defective. Numerous attempts to enforce its provisions proved fruitless. The law stipulated the manner of plugging wells and provided an adequate penalty for its violation, but it did not provide any way of ascertaining when a well was to be plugged and, if so, whether according to law or not. A law was enacted by the last Legislature, the provisions of which are given below, that remedies the weak places in the old law and makes it possible for the Supervisor to know whether abandoned oil and gas wells are plugged as they should be or not. Of course, as far as the gas is concerned, much of the damage is done, but a vigorous enforcement of the law at this late day will do much to protect the oil rock. As far as I have been able to ascertain the provisions of the law have been very generally observed during the past year by both the gas and oil interests. I have numerous requests for copies of the law, and for the benefit of those interested who may read this report I give it in full below.

AN ACT concerning the drilling, operating, maintaining and abandoning gas and oil wells, and prescribing penalties for violations of the same.

and repealing sections two and three of an act entitled "An act concerning the sinking, safety, maintenance, use and operation of natural gas and oil wells, prescribing penalties and declaring an emergency, approved March 4, 1893," and declaring an emergency.

(APPROVED MARCH 7, 1903.)

Section 1. *Be it enacted by the General Assembly of the State of Indiana,* That before the casing shall be drawn from any well, for the purpose of abandonment thereof, which has been drilled into any gas or oil bearing rock, it shall be the duty of any person, firm or corporation, having the custody or control of such well, at the time of such abandonment, and also the owner or owners of the land wherein such well is situated, to properly and securely stop and plug the same in the following manner: Such hole shall first be solidly filled from the bottom thereof to a point at least twenty-five feet above such gas or oil bearing rock with sand, gravel or pulverized rock, immediately on the top of which filling shall be seated a dry, pine wood plug, not less than two feet in length, having a diameter of not less than one-fourth of an inch less than the inside diameter of the casing in such well; above such wooden plug such well shall be solidly filled for at least twenty-five feet with the above mentioned filling material, immediately above which shall be seated another wood plug of the same kind and size as above provided, and such well shall again be solidly filled for at least twenty-five feet above such plug with such filling material. After the casing has been drawn from such well there shall immediately be seated at the point where such casing was seated a cast iron ball or a tapered wood plug at least two feet in length, the diameter of which ball or the top of which wood plug shall be greater than that of the hole below the point where such casing was seated, and above such ball or plug such well shall be solidly filled with the aforesaid filling material for a distance of at least fifty feet

Sec. 2. The person, firm or corporation owning or having control or custody of any such well or the land in which any such well is situated, shall file or cause to be filed in the office of the Recorder of the county in which any such well is located, within fifteen days after the same has been plugged, as provided in section one, the affidavit of at least two persons who assisted in the plugging of such well, which affidavit shall be recorded in the miscellaneous record books in the office of the recorder of such county, and shall set out in detail the manner in which such well was plugged and the depth of each such wood plugs and iron ball below the surface of the ground, and the record of such affidavit shall be prima facie evidence in any court of a compliance with the provisions of this act.

Sec. 3. It shall be the duty of any person, firm or corporation sinking a well in any oil or gas-bearing rock, or having sunk such well and maintaining the same, to case off and keep cased off all fresh water from such well.

Sec. 4. Any person, firm or corporation that shall, in any manner, fail or refuse to plug a well in the time and manner provided in section one of this act, or shall fail or neglect to secure and file in the proper

Recorder's office the affidavits provided for and required in section two of this act, or shall fail and neglect to properly case off fresh water from such well and keep the same cased off while said well is maintained, as provided in section three of this act, shall be liable to a penalty of two hundred dollars for each any (and) every violation thereof and to the further sum of two hundred dollars for each ten days during which such violation shall continue, and all such penalties shall be recoverable in a civil action brought in any court of competent jurisdiction in any county in which such violation occurred, brought in the name of the State of Indiana on the relation of such county and for the use and benefit of such county, and in all such cases if there be a recovery by the State it shall recover in addition to such penalties a reasonable attorney's fee.

Sec. 5. Sections two and three of an act entitled "An act concerning the sinking, safety, maintenance, use and operation of natural gas and oil wells, prescribing penalties, and declaring an emergency, approved March 4, 1893," are hereby repealed.

Sec. 6. To better enforce the provisions of this act the Natural Gas Supervisor of the State of Indiana is hereby empowered to enter upon any land at any time for the purpose of examining and testing any such well or wells.

Sec. 7. Whereas an emergency exists for the immediate taking effect of this act, therefore the same shall be in force and effect from and after its passage.

Compressing Stations.

The annual report of the Natural Gas Supervisor for the year 1901 states that there were 41 compressing stations (usually known as pumping stations) in operation in the gas field at the end of that year. The total number of compressors in use is not stated, but it was not far from 100. The same report says: "With the decrease in the rock pressure in the field came the necessity for using compressors on pipe-lines. 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." I agree with this, except that compressing stations were used before the decrease in the rock pressure was sufficient to notice. Where gas was to be transported a long distance, as was the case with the Ohio and Indiana Gas Company and the Indiana Natural Gas and Oil Company, it was necessary to install compressors at the beginning. With the aid of powerful compressors there is hardly a limit to the distance that gas can be transported. For the purpose of protecting the gas territory, the General Assembly that convened in 1891 attempted to regulate the production and transportation of natural gas by enacting a law (Acts 1891, page 89) prohibiting:

1. The transportation of natural gas at a pressure exceeding 300 pounds.

2. The use of any device or artificial process to increase the flow of gas from the wells or for the purpose of increasing the flow of gas through the pipe-lines.

A law enacted by the last General Assembly in substance repeals the act of 1891 except the provision regarding the 300 pounds pressure, and with the present conditions there is little use for it. Though I know it is impossible for any company in the field with the limited supply of gas, to raise the line pressure to the maximum allowed by law, I have tested the pressure in all of the lines transporting gas from the most powerful compressors in the field and have not found the pressure at any place above 200 pounds.

While compressors can be used now without violating any law so long as the pressure is not raised above 300 pounds to the square inch, yet it can not be said that their use is not a detriment to the field. Wherever they are used they have the effect to create a vacuum, not only in the pipes back of the compressor but in the gas rock, and when the pressure is removed from the rock the salt water rushes in and fills the space once occupied by the gas. My observation leads me to believe that where compressors are used in a given territory, the gas rock in the vicinity of the wells under the influence of the compressors soon succumbs to the salt water.