DEVELOPMENT OF NO. 2, OR WELLSTON COAL.

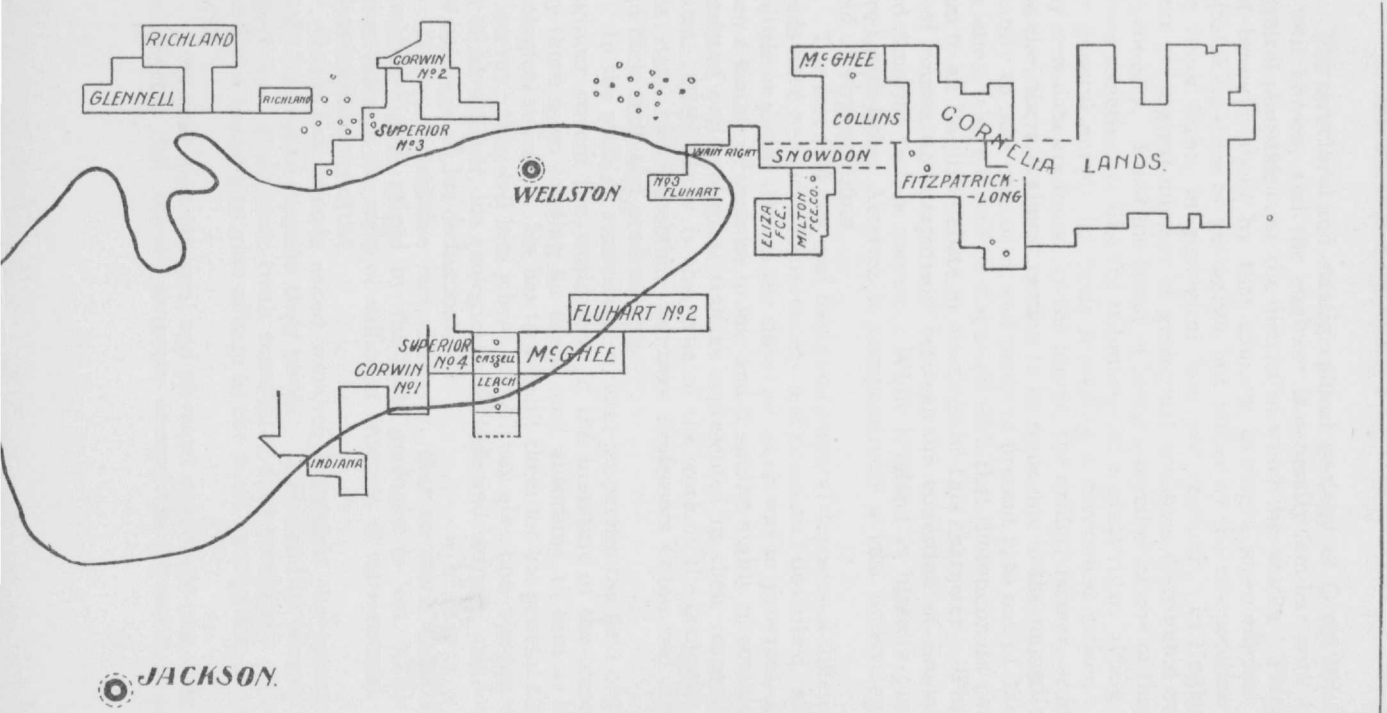
BY MR. EDE.

Gentlemen, before reading this paper I will ask your attention for a few minutes while I describe this map:

The red line represents the contour of the Wellston coal as laid down by Prof. Orton. The colored parts protruding across it at various points show the tracts belonging to different coal operators and now worked for coal. The cluster of dots here and there show the different drill holes bored along the supposed border. These were, in most cases, sunk to test the ground for coal before purchasing. In reference to these I have to say, that their location only represents the sections or quarter sections where they are to be found. An approximate location being all required to satisfy my proposition. The colored tracts distributed outside the red contour line represent tracts of land where the Wellston coal has been found by drilling.

In this paper that I am about to submit I shall attempt to show you first, that coinciding with the red contour line, for a considerable distance, there is to be found a certain structural arrangement, that if carefully studied will assist the engineer in determining his modus operandi, and help the prospector in his search for the coal in its locality; second, that if precaution is to be taken against hydrogen gas, as advised in the interesting paper read before us this morning, this should be done in the locality of the structural phenomena which we claim to be a part of the conditions of the Wellston coal basin; third, that the crop of the Wellston coal extends beyond the old limits and that there is a probability of other mines being opened on this celebrated seam to the north and east of the old limits.

The geology of a country, its structural and dynamical features is determined, not at once, but in time and by the aid of different agents. The miner, the prospector and engineer are continually finding facts which, though apparently of little moment, are to the geologist the missing link in a chain of tedious investigation, which settles a proposition that in after years may become the base line of a geological fact.


RICHLAND
GLENNELL
RICHLAND
CORWIN No 2
SUPERIOR No 3
WELLSTON
No 3 FLUHART
WAIN RIGHT
McGHEE
COLLINS
SNOWDON
CORNELIA LANDS
FITZPATRICK-LONG
ELIZA FCE.
MILTON FCE. CO.
FLUHART No 2
SUPERIOR No 4
CORWIN No 1
CASSELL
LEACH
McGHEE
INDIANA
JACKSON

The structural and stratigraphical geology of Great Britain is well known, and the engineer is generally familiar with the physical phenomena of the district in which he works. This is not brought about by that country having a more efficient or painstaking class of geologists, but rather by the co-operation of the lesser lights in geological lore and research. In England there are a great number of geological societies distributed over the country. I had the honor of being a member of one of these. These societies are like the tributaries of a great river, aiding to the general supply by their spreading a diversified action. If any new data are found by the miner, the driller, farmer, or any one else, there is almost certain to be some one in the immediate vicinity to take care of it, and ready to present it to one of these societies, where it will be discussed with that thoroughness common to an English debate in meetings of this character. There is, of course, no comparison between the condition of England and America in this respect. While England is literally punctured with holes, America is comparatively a vast undeveloped field of virgin ground.

The fact that our coal fields and mineral deposits of different kinds have been so approximately laid down and described, with so little available data at the time the work was in progress, has been a matter of surprise to me, and it speaks highly in commendation of our geological staff as represented in their respective states. Particularly is this true of the work of the geologist of this state, our respective members Professors Orton and Lord and their staff, and predecessors.

In the work of examining mineral properties the field of the engineer covers the world, and in the literature of the present day there is no reading so useful and absorbing to him as the geological reports. He has to consult them for his general lines of survey; they tell him where he is; they give him the character of his subject, his geological longitude and latitude, and form the base line of his deductions.

It is a lamentable fact, however, that so much data that would be highly prized by the State geologist is lost. This is either through the want of sufficient interest, or carelessness, or a less meritorious cause.

One of my friends asked whether I thought the operators would like me to mention their mines. I replied that where the object was to advance truth reasonable men would not object, and I saw nothing to give offense to the most susceptible in this paper.

I say that the structural and physical conditions of a district are subjects that should seriously occupy the attention of the

conscientious engineer and foreman. The want of a thorough acquaintance with these has often been the cause of disappointment and failure. Many a foreman has been led astray through expecting to make a success in a new field on lines he adopted in another, or, indeed, in two mines in the same district where the conditions vary.

Pertaining to the field we are now considering, I shall show you that it presents some structural features worthy of consideration. To-day a tract of the Wellston coal is considered valuable property. It has changed hands recently for $250,000 per acre. How much of this coal is still left is a matter many of our operators would like to determine, and a discussion on these lines cannot other than afford them and others associated with this field the greatest interest.

In the map before you I have shown you the various mines included in the Wellston coal field as laid down by Mr. Orton. It is rather a noticable fact that most of the mines that have been worked outside the line thus described show certain marked characteristics, structural phenomena, that lead one to think they have entered another state or condition of things from that inside the line.

I call your attention to the map, and ask you to note the position of each mine or section as I refer to them. The first mine is the Tom Corwin No. 2. The coal here was cut at about a depth of 45 feet; the main entry starts about north from the the shaft. It was intended to have driven this entry into the center of the property; but within about 200 feet of the shaft the bottom began to raise rapidly until it reached 30 feet above the level of the bottom of the shaft. It was then suspended in the hope that the hill would be cut off, east or west, by the butt entries. In the western entry a small swale was followed for sometime, but there was not much gained by it, as the hill was cut again. On the summit of the hill the roof is broken and the coal only about six inches in thickness, more or less. From the top of this hill they sunk on the other side. When I last saw the coal it had almost reached its normal thickness.

If a series of holes had been sunk from the surface on the side of this underground elevation it would tend to indicate that the margin of the coal had been found at this place. Such, however, is not the case, as other holes on the property, and the work on the north side of the hill conclusively demonstrate.

The ridge and furrow condition is to a more or less extent a common feature in the mines contiguous to the line of the field shown on the geological survey, and on the accompanying map, and is a part of the structural arrangement I desire to outline.

Adjoining Corwin No. 2 is Superior No. 3, one of the most successful mines of the district. I believe they have hoisted more coal out of this mine in one day than from any other in the district. Here, however, may be seen the same structural condition as at Corwin No. 2, but in this place the hill was penetrated, an opening secured, and afterwards every advantage taken of the conditions to open the mine. They keep a permanent engineer, have the mine posted up closely, so that the foreman has a good conception of the irregularities of his ground, and is thus enabled to determine his modus operandi.

Between Superior No. 3 and Glen Nell a number of holes have been drilled. In some of these coal was struck; in others it was absent. The drilling indicated something of the condition of things noticable at Corwin and Superior mines. It is not at all improbable that when this ground is approached by the workings of the adjoining mines some good patches of coal will be found, and still north some mines opened out.

Glen Nell was opened out by Mr. Jerry Morrow, a gentleman whom I am informed was one of the pioneers of this now celebrated coal field. The same features are observed here. In driving one of the entries the coal commenced to rise rapidly, as observed in the other mines. The difference of elevation here and at Buckeye, an adjoining mine, gave some the impression that this was the number one seam of coal. This difference, however, is being rapidly diminished through the upheaving of the coal showing the structural arrangement referred to. North of this mine on the Richland property there is a good crop of coal in a disturbed stratification.

Between Glen Nell and Superior No. 3 mine there is an interesting piece of land projecting into Vinton county whereon the Wellston coal is to be found.

Leaving here and passing to No. 6 Superior, a mine well within the old lines, and with the coal about the same as generally found, we find to the west of this, and outside the line, on section No. 36, Jackson township, and in the locality of Canter's Cave, an opening on the Wellston coal showing the same condition of things as at the places mentioned, the coal dipping rapidly in a small opening made in the hill.

Coming around on the south side of the field we note the Indiana, Cameron, and Corwin No. 1, over the line. I am not aware of their being in any of these mines indications of a disturbance of the nature we have referred to. These mines on the borders show some slate in the coal, and in proximity to the line indicated. Superior No. 4, in the south part of the mine does not produce coal equal to that produced in the north, but it is

workable and marketable coal. Holes have been drilled on the south-east quarter of section No. 1 showing some coal, but on section No. 12 the result was not as satisfactory. Some of the holes showed coal, others none.

The coal in Fluhart No. 2 for a portion near the boundary shows more bone, but no marked disturbance. After leaving here we again meet the same phenomena. This is observable at Superior No. 6, Fluhart No. 3, Wainright mine, and by series of holes on sections 31 and 32, connecting with Corwin No. 2, the place of beginning.

We have now followed a peculiar structural arrangement from Fluhart No. 2 to close to Jackson. The value of this is best estimated by those whom it concerns.

I may say that, to the geologist, this line of structural arrangement of the floor of the basin of this field is interesting as far as it helps to show where the pressure and resistance occurred, how the basin was formed, and throwing some light on the local dynamic agencies instrumental in the formation of the field, and in so far as it disposes of theory for fact. To the engineer these facts are the first that should receive his attention. They are as important to him as is the kind of roof or floor he has in his mine. Instances can be given where hundreds of dollars a month in dead cost is the result of the want of a proper consideration of these facts. It is a matter he has to study and follow closely, and I shall offer no apology for presenting this matter to him in the present form. Having been a mining engineer all my life I presume to have some conception of the difficulties he has to encounter, and in presenting this I had some of these difficulties in view.

I claimed that the Wellston coal extended beyond the old limits. If this plan is a fair representation of the field, as laid down in the geological survey, there can be no question on this head. Corwin No. 2, Superior No. 3, Glen Nell, Buckeye, and part of Indiana, Corwin No. 1, Fluhart No. 2, and the whole of Wainright mine are working to-day outside the old limits. Also to the north on Richland and elsewhere in Vinton and Jackson townships this coal has been found and drilled upon in different places. To the east of Wainright mine, on the Long and Fitzpatric land, four holes have been drilled, in all of which the Wellston coal was found in good thickness, and there is no question but that the field extends here and further. Of the presence of this coal we have very satisfactory evidence given us by Mr. Pixley, who writes: "This is to certify that I, George W. Pixley, drilled two holes on the Fitzpatric land, and two on Long's land, with the following result: On Fitzpatric's land I found in one

hole two feet eight inches, and in the other three feet of No. 2, or Wellston coal. On Long's land I found in one hole three feet four inches, and in the other three feet of the same grade of coal. I hereby guarantee to sink within a few feet of either of the holes on these properties and find the same result as above stated or forfeit the expense of drilling."

On the Cornelia lands still further east, the Wellston coal has been found by drilling; also, on lands still further east, this coal has been found. This would represent in length an extent equal to the original field, and in the near future I have no doubt that many mines will be opened east and north of the present limits that will help to furnish coal to a greater or less extent to those who value the superior fuel of the Wellston coal.

Summarizing the contents of this paper, and what is shown by the map, I submit that from the study of this field we learn, first, that contiguous to the line of the old survey from Fluhart No. 2 to Jackson there is a structural peculiarity common to the mines worked in that locality; second, that the development of the mines in the neighborhood of this line must be governed by this structural characteristic; third, that the fact of finding no coal in some of the holes drilled does not always show the margin of the field; fourth, that the Wellston coal field is not exhausted, but that there is so much of it undeveloped, that it extends to the east and north, and, possibly, in other directions.

THE CHAIR: Gentlemen, you have heard Mr. Ede's paper. It is now open for discussion.

PROF. ORTON: I would like to ask if he has made any connections with the coal on the Marietta Road?

MR. EDE: No sir, I have not.

MR. ROY: I would like to say a few words on that paper. It is a delicate subject to talk about, especially if talking to go into print, for the reason that some of these mines that are mentioned there are on the extreme margin of the basin and if it became conceded that there is likely to be little coal beyond where the shafts are opened, it has a depressing effect upon the mineral property. I would like to have been with Mr. Ede when he looked at the old survey. It was got up by Mr. Orton and his son Edward came down and went over the ground very carefully and I have always thought it was very accurate and

was not aware there were any mines outside of it, either in the opening of the mines or extent of the workings underground. Now this mine of Patterson's that he speaks of being opened in that thin coal was known before Mr. Patterson made the investment at all, because he had the map there and he was told that likely there was very little beyond where that map indicated and at least he ought not to be disappointed if he did not find as good a field as he expected, but I believe he feels so now. Now as to the Glen Nell No. 1 vein, that is a lower strata than the Wellston Coal No. 2, there is no doubt about that.

MR. EDE: You mean No. 1, don't you?

MR. ROY: I say that the Glen Nell mine is not the Wellston vein, it is a lower coal, and if we were going over the ground, in ten minutes I could convince you of that. The distance geologically between the two, the horizon distance between the two, is about 70 feet. I took an engineer's level once and got the county surveyor to go with me and we leveled from Wellston down to these mines and down to this Glen Nell mine and we found there was 70 feet of distance between the two coals. I have gone up on the hill 70 feet or so and opened up, because I had an idea of buying some then and opened up the Wellston coal and it was about 70 feet above this coal. Now this Glen Nell coal has been a puzzle to me always. While I never doubted it was a lower vein, I did doubt if it was the Jackson coal, because, following the Wellston vein down towards Jackson, it is seen to rise in the air and disappear forever, about a mile or three quarters of a mile from the———— on No. 1 below Jackson town. The engineer's level was placed at the mouth of the opening and cited on the courthouse dome and then we measured from that point down from the lower coal vein into the No. 1, the Jackson shaft coal and the distance was 175 feet, while the distance between these two veins at the Glen Nell is only 70 feet. Now that indicates a rapid divergence of the strata, if it be the same vein, something I have never seen in the state before. In the deepest shaft at Jackson, a shaft about 90 feet deep, about 20 feet from the surface of the ground there is another vein, which

would make it about 70 feet above the Jackson shaft coal, and I was sometimes inclined to think that was the Glen Nell. If Dr. Orton were younger and in better health, I know he would like to go down there, because it is a question that he has often talked to me about. He said if he lived where I live and had the time I had, he would unlock these questions.

MR. HARRY: This is rather a delicate subject for us to handle on account of the way we are connected down there. I would like to make an assertion, and I think that events will bear me out in it, that there is no No. 2 coal under the gray lime stone of minable thickness. That is quite an assertion for a man to make, but I have had some experience down there.

MR. ROY: You are right about that.

MR. HARRY: I think wherever the gray lime stone comes into the surface, you might as well quit looking for No. 2 coal. While Mr. Ede was showing you the faults, we have in the mine where I am at there, I guess the most gas of any place in Jackson county and I guess in the State of Ohio. East of our shaft, 600 feet east of our shaft, the No. 2 rises 27½ feet in 200 feet and I know it keeps that level for over a mile; that is, after it takes this jump up, that it keeps that level for over a mile and a half. Then it rises a good deal more than that, but it never goes below this 27½ foot level. We have a raise then in a little over a thousand feet of nearly 25 feet more. I traced that ridge for nearly a mile in a south-easterly direction from where we commenced drilling. I am confident from what I know or what I have seen myself in regard to Jackson county coal that, as far as No. 2 is concerned, that there isn't any No. 2 under the lime stone.

A MEMBER: What do you call the gray lime stone?

MR. HARRY: The ferriferous, the big vein.

DR. ORTON: Mr. Chairman, I don't care to prolong this discussion, but it quite warms my blood to have these questions come up. I rejoice in the advance of knowledge. I have always felt sure the facts would come to the surface. No man whose

work is worth anything in the world objects to new facts. If the theory don't match the facts, it is the worse for the theory. I have never had any theories. I always get as close as possible to the facts as developed. If facts have gone forward, I am glad to know it.

In regard to the last assertion, that Wellston coal never comes under the gray lime stone, I would not like so well that general statement, but I would think it was eminently probable that it would be so. We all have our theories. My theory, to which I am constantly more wedded as I find the facts coming in, is that these coals are marginal deposits and the facts that Mr. Ede brought out match very well to it. Here was the sea line to the northward and here are the tongues of land, the hollows in which the coal was deposited. You follow down until you come to the mud shore of the old sea here, and in this direction I think the coal would run out, because it had no chance to grow. But I would not look so far in this direction as in this. I have not the scale of the map here, but I should say it is along here some where in Vinton county where this coal is found. But while it is a precious body of coal, we know it is quite restricted. We are glad of every new area that can be added. But it is certain from the development along the line here that it is local for Jackson county and part of Vinton.

MR. ROY: I would say for Dr. Orton's information that the facts bear out his idea of the extent in that direction, but it is thin and in small patches and not in minable thickness, except that little place by Elk Fork (?). That is the only coal of minable thickness in that county and about three miles south of that, where it has been found of minable thickness. But, whenever you can trace it out as far as Logan, it is always just above the sandstone, but when you go southward into Wellston, there comes in this lower deposit that continues all the way down to Jackson until, as I said, there is 160 or 170 feet of strata between the two. In other words, the Wellston coal at McArthur and up as far as Logan lies upon the Logan sand stone everywhere.

MR. EDE: I would like to reply to this discussion. It has taken a somewhat different form to what I expected. I make no

question as to No. 1 and 2. I present this to show that the line that was given as the boundary of the field—that outside of that there are structure arrangements which it is important for engineers to bear in mind. There is too much delicacy about this. These matters are matters for the public to know. Now in that plan, I simply confine myself to facts as an engineer, leaving it of course to discussion. So far as the horizon of a coal is concerned, I do not put much on it, if I was to enter into the discussion, because when a thing is found here and there and you are upon the confines of a basin, you have not that data which you find when you have followed it for miles. So far as the coal being underneath the ferriferous lime stone is concerned, I have spoken to many men who have drilled through these things and they have said that they have had the coal. One time I drilled and spent my own money and I didn't get it. But, these other men I have confidence in. They didn't say it was thick.

MR. HARRY: As far as these gentlemen saying that they have drilled in certain parts of the country and found coal, I am not disputing that. And possibly I went too far when I said there wasn't any coal under the lime stone. What I meant was, no coal in minable thickness, and I got my experience or my knowledge by paying pretty dear for it. That is the reason I know this. Then I know of other mines that are being worked to-day, and as soon as they strike the lime stone they quit mining coal.

MR. ROY: Another thing which I know Dr. Orton will be interested in. I drilled until I spent about $3,000 south of that old mine to find the Wellston coal. I found it, but always thin. But it is a fact that the margin, the outcrop of the ferriferous lime stone, is south of that old line that you drew of the extent of the Wellston station. Why it is so we cannot tell. But it is so and the gentleman was right when he said there was no minable coal under the lime stone in Jackson county. There is in Vinton county.

THE CHAIR: If there is nothing further on this subject, we will proceed with the next paper on the programme. We

have a paper by Mr. Willard on "The Grouping of the Coal Strata". This paper was presented to the institute a year ago, but at that time it was decided to take it up again at this meeting, in order to have it more fully discussed and particularly in the presence of Dr. Orton, who is with us this afternoon and who will join with us in the discussion. Therefore we will ask Mr. Willard to present his paper again for the purpose of opening the discussion.