
HISTORY OF COAL MINING IN IOWA

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COAL STATISTICS

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CHAPTER III

HISTORY OF COAL MINING IN IOWA

BY JAMES H. LEES.

Various sources have been utilized in the preparation of the following notes. A large part of the information has been gained by interviews and correspondence with the men who have been instrumental in the development of the industry, or from those who have seen its growth. The reports of the present Survey, as well as those of previous ones, have been used, as have also other publications of various kinds. No claim is made for the completeness of the history; only such salient facts are given as could be gathered together in the time at the writer's disposal. The accompanying data and tables on the production of coal in Iowa, prepared by Dr. S. W. Beyer, will be found useful in illustrating the growth of the state's most important mineral industry.

So far as can be learned the first mining of any consequence in Iowa was done about 1840. The early settlers in many cases knew of the existence of coal beds but wood was so plentiful and offered so many advantages in the way of convenience and cleanliness that there was no inducement for using the less cleanly supply of fuel stored underground. In many cases coal was considered merely as a curiosity to be laid on the mantel. At about the date mentioned, however, the demand for coal had become great enough so that mines were opened in the eastern part of the state and within the next twenty years the industry had gained a foothold, although still a somewhat precarious one, over practically all the productive area of the state.

Van Buren County. Mr. Jacob P. Alfrey of Farmington, Van Buren county, who was the first white child born in Iowa, is authority for the statement that the first mine opened up in the vicinity of Farmington was operated by Lem Brattain in 1840. He ran the mine for a few years and then sold out to Samuel Knight who conducted the business until 1848 or 1850. During most of the period of Mr. Knight's operations there was no railroad into Farmington and hence his market was chiefly local. Some coal, however, was hauled as far as Keokuk by team. The steamboats which came up the Des Moines also used large quantities. The coal was of excellent quality and much desired for steam purposes. Mr. Knight finally sold his mine to the New York Coal Company who operated here for about twenty years. This firm worked the mine on quite an extensive scale for those days. From forty to fifty men were employed and the mine was connected by a switch with the Des Moines Valley railroad, which has since become part of the Chicago, Rock Island and Pacific. In those days miners were paid about five cents per bushel for mining and the coal sold at the mine for from \$2.00 to \$2.50 per ton. During the fiscal year of 1854-'55 about 100,000 bushels of coal were raised in the Farmington district. This had an average value at the mines of six and one-fourth cents per bushel. At the Mississippi river markets it retailed at eighteen to twenty cents per bushel, or \$4.50 to \$5.00 per ton.

About the same time, during the later 40's, coal was taken from mines owned by Senator Eliab Doud, near the present town of Douds. The mines were managed by Mr. Van Sicle, who was an intelligent and enterprising mine operator, and coal was supplied to the steamers running up the Des Moines river.

In 1856 Alexander Findlay opened up the first mine in the Douds district to be operated on a large scale. This was a slope mine located northeast of Douds. It was run for several years and later shafts were sunk in the same vicinity. Before this time there had been a number of small openings in the hillsides, the first of which were opened about 1846 or '48. They were operated only during the winter months to supply the local demand. Alex. Findlay's business was carried on by his son Hugh, who after the exhaustion of the old mines at Business

Corners sank a shaft in 1892, about a mile and a half to the northwest. This was operated to supply the railroad chutes at Douds until it caught fire three years ago. Since then another shaft has been sunk. The Findlays have also done some mining near Cedar creek, three miles north of Birmingham. Mines have been run in this vicinity ever since.

When Dr. D. D. Owen made his studies in Iowa in 1849 he found quite a number of banks opened in various parts of the county. He states that the coal esteemed the best by the blacksmiths in the neighborhood of Bentonsport was that from Jackson's bank.

Worthen mentions several mines as being in operation when he visited Van Buren county in 1857. Among these were the Cox and the Martin banks north and northwest of Hillsboro, and several along the Des Moines river near Iowaville, a town which has since gone by the names of Independent and Selma. He states that one of the Hillsboro mines was working a seven-foot vein divided by ten inches of slate. According to this author the best coal came from Business Corners and Iowaville and was mined from the "second seam."

Another mine near Farmington was opened in 1844 by Mr. Slaughter. Ten years later James Alfrey opened up the Alfrey mine which has been operated more or less up to the present time. At present there are five mines working in this district and about thirty men are employed.

In 1892 the Ratcliffe Coal Co. opened a mine one mile north of Douds and operated it about four years. They then abandoned this and worked one over at Business Corners, about a mile southeast. After working this out they returned to their former location and sank a new shaft adjacent to the old one. This is still in operation and is at present supplying coal to the local chutes of the Rock Island at Douds.

The Felmlee Coal Co. opened a shaft mine near the Findlay mine about four years ago and ship some coal from their mine.

When C. A. White inspected this region in 1868 he found that the McHugh mine at Independent had been running a long time and that there were other mines in the same locality which were supplying a local trade. In addition there were local mines in

operation near Keosauqua which had been worked for many years previously. There were also several mines near Bentonsport. The Farmington mines had been operated extensively to supply Keokuk and other markets.

It will be seen that coal has been mined in nearly all parts of Van Buren county, but as this shares with the other marginal areas of the Lower Coal Measures the pockety character of the coal basins the county has not been able to keep to the front in the keen competition of recent years. After the Civil war the price of coal and the wages paid were about the same as at present. About ten cents per bushel or \$2.50 per ton was the selling price at the mine and if a certain amount was sold a tax was laid on the output. Near Fairfield wages were sometimes as high as \$2.00 per ton, owing to a bad vein, but near Douds the price was about \$1.00, as at present. After the panic of '93, however, prices dropped until coal was mined for three and one-half to less than three cents per bushel, or ninety to seventy-five cents per ton, and sold as low as \$1.25 per ton. In the Farmington district the current wage for mining is eighty-five cents and the selling price \$3.00 per ton, delivered.

Miners at Douds are chiefly American and British. All of the Van Buren mines have been very simply equipped. Mule haulage and gin hoist has been the extent to which they have gone with one or two exceptions. In this they resemble most of the mines of the eastern coal counties. The beds are too local in extent and the market too limited to warrant much expenditure of labor or capital. As in other localities also much of the early supply of coal was obtained by stripping as well as by drifts. Shaft mines are shallow, ranging from thirty to seventy feet in depth.

Scott County. About the same time that operations began in Van Buren county the pioneers of Scott county were beginning to use coal. So far as is known to the writer the first notice of coal in Scott county of scientific nature is by Owen in his report on the Geology of Wisconsin, Illinois and Iowa. He visited Scott in 1839 and mentions an outcrop of coal along Duck creek (Tp. 78, R. 4 E., Sec. 27, N. $\frac{1}{2}$), of which he gives an analysis. No mention is made of any mines in the region at that time. The

first bank to be opened up was by Mr. Wright in 1840. This mine was located near Jamestown, a few miles north of Buffalo. These two places have been the centers of all the mining done in Scott county. Mr. Wright ran his mine until after the war when it was leased by Hiram Hall, who operated it four or five years. The property was then bought by Robert Williams who worked it for some time. Coal is still being mined on this property.

Mr. Williams started the first mining operations at Jamestown about 1848, by opening a mine on his property. This was run intermittently until 1855, and from that time until the present mining has been carried on steadily. In 1854 John Murray began taking coal from his land and carried on work until 1903. The year after Murray opened his mine John James began mining near Jamestown in a basin which extends about two miles in a northeast-southwest direction. The basin is, however, very narrow, only about fifty yards wide, before it begins to rise to the sides, with a total of 200 yards. Coal in the "swamp" is five feet thick, and thins on higher ground to two and one-half or three feet or even less, where worked. About 1860 John Morris came to Jamestown and began operating the James mines, which he managed for twenty years. With his coming systematic mining really had its origin. He opened drifts from the creek valley and later was the first man to sink shafts. The coal was raised from these by horse power. The daily output by 1868 was from 1,200 to 1,500 bushels, upon which Mr. James received a royalty of a cent a bushel. This coal sold for fifteen cents a bushel although the usual price has been from eight to ten cents, of which the miner received from five to six cents, depending on the selling price. In the winter of 1856-'57, however, coal was hauled to Davenport and sold for fifty to sixty cents per bushel, owing to a coal famine. A few years later, after the war, the price had dropped to twenty cents. In ante-bellum days farmers drove to Jamestown distances of fifty or sixty miles to obtain coal. Oftentimes there would be a line of seventy-five or 100 teams waiting at the mines for a load and many of these would wait two or three days for their supply. The mines were kept working at their full capacity all through the

season and miners would put out from fifty to 100 bushels per day. From 1870-'73 there were 200 to 300 men at work in these mines.

After Morris left the district Mr. James began operating the mines himself. These are still in operation, although not extensively. Work is confined chiefly to taking out what coal was left during earlier operations. About the time that Morris left some of the mines put in hoisting engines. At present none of the operations are extensive enough to employ anything but horse gins.

While John Morris was opening up the James mines Robert Williams was also beginning more extensive operations on his land and by 1870 he had two shafts at work and was employing fifty or sixty men. Mines have been run on the Williams property ever since.

There were also a number of mines worked on the Durham estate between 1858 and 1898. The bed here was quite extensive, underlying probably 150 acres. It was quite level and ran from two feet eight inches to three feet four inches in thickness. There were also a number of other banks near Buffalo and Jamestown which were operated from the fifties until comparatively recent years. One of the most important of these was the bank of Charles G. Rowan, who began mining southwest of Jamestown in 1869 and operated until 1904, when he retired. Since then his mines have been operated under lease. The coal runs from two and one-half to three and one-half feet, and is of excellent quality for fuel.

Among the more important of the later operators has been Thomas Webster, who came to Scott county from the east twenty years ago and mined near Buffalo from that time until he retired about two years ago. He has opened one drift and four shafts. The later shafts were equipped with steam pumps although hoisting was by horse power. The coal is rather soft but is bright and does not carry much sulphur. Mr. Webster's sons, Robert and Ralph, are now operating a shaft two miles below Buffalo which they opened in the fall of 1908. It is fifty-five feet deep and reaches a vein three to four feet and locally five feet thick. The prospects for mining are better near Buffalo than at

Jamestown as the coal in sight near the latter place is nearly worked out. There are still several mines operating near Jamestown, however, but all on land which has been worked for many years.

Mining in the Scott county field has always been rather haphazard. There has not been much system about prospecting and in a field of such nature as this one only systematic work can yield the best results. In the Buffalo district mining is done by shooting but at Jamestown pick work and wedging is the rule as the coal is so seamy that it will not stand blasting. During the first thirty years of mining operations the openings were all slopes or drifts, but since then most of the coal has been removed from shafts. As the Coal Measures are thin these shafts are never very deep, varying from forty to 125 feet. The miners push their cars to the shaft and cage them, as the roadways are too low for mules. Mining is prosecuted on the room and pillar plan. None of the mines have railroad connections and hence the market is of necessity limited in extent. Some years ago Mr. Webster shipped coal as far as Muscatine, Fulton, Durant, etc., but of late years the territory is more restricted, not extending beyond Davenport.

Muscatine County. Although the Coal Measure outlier which has been mined so long in Scott county occupies a larger area in Muscatine, not much coal has been mined within the last named county. Only one vein is of workable thickness and this is of inferior quality. Operations have been going on for over fifty years, however, in the vicinity of Muscatine. The localities which have been most extensively worked are West Hill in Muscatine and the Hoor property about three miles east of town. The former of these, like most of the other openings along the bluffs, ceased to be productive long ago, and the latter was abandoned on the death of the owner, about 1892. It was a drift mine and was worked for a number of years, so that the entries were driven into the hill about 1,000 feet along a three-foot vein. A number of other small banks were operated in the eastern part of the county, and about 1895 a few drifts were opened about five miles east of Muscatine, near the edge of the outlier. A few thousand bushels of coal were removed from these for purely local trade.

Lee County. Lee county is another of those lying on the border of the Coal Measures within which coal mining has been carried on in a desultory manner for many years. A number of small outliers occur in different parts of the county and coal has been taken from these since the early 50's. When Worthen made his survey of the Des Moines valley in 1856 he noted that coal had already been opened up along the Skunk river in the northern part of the county. The seam worked was ten to fourteen inches thick. In later years considerable coal was taken out by drifting and stripping. One of the oldest and best known localities was the Norris mine in which the coal was said to be twenty-four to thirty inches thick. Another mine which was of considerable local importance was the Hardwick mine, five miles west of West Point. The vein here mined was three to three and one-half feet thick and was reached at first by shaft and later by drift. This mine at one time furnished abundant supplies for the local market but no work has been carried on here for a number of years.

Jefferson County. Jefferson county coal was exploited earlier possibly, than that of any other district in the state and White states that "many years before any railroad had reached Iowa Fairfield coal was carried in wagons to the Mississippi river towns, and was in high repute among blacksmiths." As early as the time of Dr. Owen's reconnaissance up the Des Moines river in 1849 coal of excellent quality was being mined on Walnut and Cedar creeks, near Fairfield in Jefferson county. A few years later, in 1856, when Worthen examined the district, the Huntsinger coal bank, two miles south of Fairfield, and the Richardson bank, two miles west of the same town, were in operation. Worthen further states that the lower coal seam was opened in nearly every township in the county.

By the time that White was making his survey of Iowa the Burlington and Missouri River railroad had been built through Fairfield and two mines, the Heron and the Richardson, were shipping coal over it to Burlington. At the same time Brown and Company were working a four-foot bed of coal at Coalport, ten miles east of Fairfield and were shipping a large part of their output to Burlington and intermediate points. As the

mines were nearly a mile north of the railroad the coal was brought to it over a wooden sidetrack. Coal was mined by this company for nearly thirty-five years preceding 1894.

The most important mines in Jefferson county were located at Perlee, about seven miles northeast of Fairfield. The Jefferson County Coal Company operated several mines here between 1870 and 1884. The first of these was a shaft mine sunk to three to three and one-half feet of coal and used mules for underground haulage and steam hoist. During the last year or two it was worked a single rope with steam power was used to bring the coal to the bottom of the shaft. About 100 acres were mined out. Another mine was sunk about 1888 but does not seem to have been operated long, and the district is apparently worked out. The Washington Coal Company also operated a shaft mine which penetrated two seams of coal about three feet six inches thick. The coal was considered to be of very good quality and the middle eighteen inches is said to have been used for gas making with good results.

A two-horse gin was used for hoisting and mules were used below in the main entries. As the seam was too thin to allow the mules to get to the face the cars were handled by men between the miners and the entries. The entries were blasted out to make height for the mules. The mine was worked out and abandoned about 1882. Both these mines furnished large quantities of coal to the Chicago, Rock Island and Pacific Railroad. The Jefferson County mine supplied the locomotives with an average of eighty tons a day for fourteen years.

Quite a number of local mines have been operated in various parts of the county from the earliest days until the present but in recent years the output has been very small.

Davis County. Davis has never been ranked among the large producers of coal, but for at least forty years, more or less work has been carried on in the northeastern corner of the county, chiefly for local trade. White mentions the fact that when his party was studying the coal fields about 1866 there were a number of mines along Soap creek. The first report of the State Mine Inspectors states that in 1881 there were eleven mines in operation giving employment to eighty-five men. About 1890

Ely Dye burned some coal from his drift about three miles southwest of Eldon with the object of testing its coking quality. The coke obtained was quite clean and firm and possessed excellent heating qualities, although it was somewhat soft. It was used by a brewery and iron works at Ottumwa.

Appanoose County. Probably no county in Iowa has supported so many coal mines at one time as has Appanoose. When Bain made his survey of this county in 1894 he found over eighty mines in operation at that time. The wide extent and ready accessibility of the Mystic seam make its exploitation easy and so while extensive operations do not seem to have been begun here quite as early as in some other counties mining soon assumed large proportions and the county has consistently held high rank as a producer. There are several centers of mining operations, of which Mystic, Centerville, Brazil and Cincinnati are the leaders. The Mystic field seems to have been the first to be developed. The earliest mine opened here was that of A. M. Elgin who began operations in 1857 on Little Walnut creek, a mile and a half north of the city. From that time to this there have been operations close by although the mine has never had any railroad connections. Drifts have been driven and entries worked for some time and then abandoned and new ones opened up. The hills have been honeycombed and entries are still being opened. The first large mine at Mystic was opened in 1858 by Isaac Fuller and furnished most of the coal for Centerville for a number of years. In 1881 it was made a shipping mine. It has since been exhausted.

There was not a great deal of activity in the Mystic district until the Chicago, Milwaukee and St. Paul railroad was built through in 1887. Then mining began on a large scale and has been prosecuted vigorously since. The first railroad mine was a slope opened by Wm. and Alex. Orr and Pat Colgan in 1887, and was soon sold to the Railroad company. Sixty miners were employed. Quite a number of mines were opened very shortly, among which were the Lone Star drift and the Seddon slope (both owned by Seddon Brothers), the Lee Brothers' mine, and the Silknetter slopes. All these were operated by mule power. In 1889 the Lodwick Brothers Coal Company opened a slope

and a drift, both of which had railroad connections. This firm has been operating here ever since and at present is operating six mines at Mystic, Clarkdale and Diamond. A large number of mines have been opened, both in the immediate vicinity of Mystic and in all directions from it; at Forbush and Clarkdale to the east, at Rathbun and Darbyville to the north and at Diamond and Plano to the west. Local operators have not been the only ones to appreciate the value of this field, as is testified by the Iowa Coal Company of Chicago, who opened a large slope mine in 1893, by the Brown and Bowers Coal Company of Kansas City, who drove a drift mine in 1895, the Kansas City mine, opened in 1889 by "Missouri" Williams and James Seddon and the Big Jo Block Coal Company of Chicago, who operate the Jucket mine opened in 1894 by F. H. Juckett. Along with the Lodwick Brothers the Lee Brothers have been among the important miners. They were among the pioneers and have operated a large number of mines, both those which they have themselves opened as well as several which they have acquired. At present three mines are under their control. One of these was first opened by Mr. Philips in 1865 as a local mine and was reopened as a railroad mine in 1891 by Milburn Brothers. Lee Brothers also manufacture the Lee electric mining machine, one of their own invention. While all the coal is raised from the Mystic seam there is another bed 180 feet below which so far has not been developed. The vein has been worked at Ottumwa and Willard, in Wapello county. At the latter place L. L. Lodwick formerly operated a mine which reached this coal at ninety feet. The Milwaukee Railroad uses 1,000 tons of coal a day from Mystic, and of this Lodwick Brothers furnish 375 tons.

Mining at Mystic is done on the long wall plan and the miners work in the underclay. At present all the coal is taken out by pick work. Machines were in use for eight or ten years and two years ago ten or twelve were being operated but at present (1909) none are in service. They were of the Lee longwall type. The miners have never taken kindly to their use, mainly from extreme conservatism, and when the wage scale was made in 1908 a board of three miners and three operators was chosen to discuss the machine wage scale for loaders. As they could

not agree the arbitration board was called in and in May, 1909, raised the scale nine cents at Centerville and ten cents at Mystic. All the operators in the county who were using machines immediately took them out, as the margin of profit was too slight. The decision has really worked an injury to the miners. Men who were making \$2.50 to \$4.00 per day working after the machines are now obliged to pick coal and in many cases cannot make over \$1.00 per day.

In the Centerville district the first shaft was sunk by Wm. Henderson about one-half mile from the Chicago, Burlington and Quincy depot. This was opened about 1868 and was operated by horse power. The next year Ben Kindig opened a shallow shaft in the west part of town and supplied a local trade for several years. There were several other shafts opened in the next two or three years and in 1872 the Watson Coal Company opened the first mine in the district which was equipped with steam hoist. The mine was located on land owned by A. R. Henderson and Dr. Patterson and the royalty paid was twelve and one-half cents per ton. In 1875 Alexander Dargavell, who has been one of the most influential operators in the development of this field, formed a company, with W. J. Phillips and W. W. Oliver, and sank a horse power shaft east of town. This mine is still running in a small way. Four years later the Centerville Coal Company opened a shaft and equipped it with steam hoist. This opening is still being worked but is very much improved and enlarged compared with its original condition. Coal has been mined for many years in this locality at Relay for White mentions the mine at the Talbot mill, on Cooper creek, and this is said to have been operated about fifty years ago. In 1881 Messrs. Dargavell, Oliver and C. W. Lane formed the Diamond Coal Company and sank a shaft on the Chicago, Rock Island and Pacific railroad three-fourths mile east of the depot. In 1894 Mr. Dargavell and others organized the Centerville Block Coal Company which took over the three mines mentioned above as well as others. The company have also sunk shafts of their own and are now the largest operators in the district. Diamond shaft No. 1 is still operated, by the Centerville Block Coal Company, and is one of the best equipped mines on the Mystic seam.

It was the fourth mine in the district to be equipped with steam hoist. Tail rope haulage was later installed underground and until recently machines were employed for cutting the coal.

About a year after the organization of the Diamond Coal Company the Scandinavian Coal Company was formed. A mine was sunk and equipped with steam hoist. The company have since sunk another shaft and are doing an important business. There are a large number of Swedes in the neighborhood of Centerville and they have formed several co-operative companies in recent years. A number of other companies have opened mines in the neighborhood of Centerville so that today it is one of the leading mining districts in the state.

While at Mystic the coal outcrops in many of the ravines and most of the mines are slopes or drifts yet at Centerville the coal is so deep that nearly all of the mines reach it by shafts. The shafts at Mystic are from twenty to eighty feet deep while some of those to the west at Plano and Jerome are 200 feet deep. Quite a number of mining machines have been used in the mines of the Centerville Block Coal Co. for nearly twenty years, but they were taken out after the decision of the arbitration board. The types used were chiefly the Harrison puncher and the Legg chain machine. Machines have not proved very profitable as the air had to be carried so far and the maintenance expense was so great. There is no electric haulage in Appanoose county mines, nor indeed in any mines of the southern counties. There were some mines using it but they have been out of business for some time. There is some tail-rope haulage and this is best adapted to the service. Except in those cases where electric or rope systems **have** been employed there has not been much change in **carrying** methods for some time. Cars ordinarily used hold one ton **and are** of the same size as those used for a number of years. Prior to 1876 the Iowa mines were worked largely on the single entry system. The Whitebreast Fuel Company was the first in the southern part of the state to introduce the double entry plan, about 1876 or '77. This plan is now generally used but has been improved on in some cases by the adoption of the panel system. This keeps the air on the face better and does away with the possibility of squeezes. It may also simplify the haulage and allow more work from the mules.

Mining began at Brazil many years ago before the railroad was built through. One of the mines was opened on the land of Mr. Stickler and another was opened by John Gordon one-half mile east of Brazil. After the railroad came this mine was opened up again by Lane Brothers. The first railroad mine was opened by J. A. Brazil west of the station about thirty-four years ago and is still being operated. About the same time the Philby Coal Company opened a mine and two or three years later Thomas Philips and ten or twelve miners opened a mine a little north of the depot. This is now abandoned. In 1881 the Tipton Coal Company composed of Thomas Philips, Joseph Turner and Wm. Davis, opened a mine which is still in operation, although the firm name has been changed to the Phoenix Coal Company. Mr. Turner, together with James Campbell, is still interested in the mine. At the same time James and Thomas Lee, of Centerville, who later operated some of the Mystic mines, opened a mine near the Tipton mine. It is now run by the Centerville Block Coal Co. Twenty-five years ago Messrs. Campbell and Philips opened another mine under the name of the Tipton Coal Co. This mine was exhausted last year.

A number of other mines have been opened near Brazil and a large industry has been built up. All of the mines are drifts with the exception of the Lane mine. All of the coal raised is used for domestic purposes except that required by the railroad locomotives. Railroad engineers prefer the coal from the Appanoose mines to that which is supplied from the Missouri mines across the line, as it is softer and cleaner. However, the Missouri coal, while it contains more stone, is mined more cheaply and is used on the engines to a considerable extent.

One of the most important centers on the Mystic vein is located at Cincinnati. As compared with the other districts this is rather young. Mines were opened here a short time prior to 1890. F. H. Ketchum and B. H. Johnson organized the Mendota Coal Company and were the first operators in this district. Mr. Johnson was one of the most able coal men in the district. He is now engaged in mining operations at Centralia, Washington. The Mendota Coal Co. now operate three mines, the last one of which they bought a year and a half ago. David Dinning

was the next oldest operator. During early operations in Appanoose county he was a miner and worked for the Diamond Coal Company. Later he with his brother-in-law, David Steele, organized the Thistle Coal Company. Mr. Dinning is now mayor of Cincinnati and vice-president of the State Operators' Association.

The mines at Mendota, just across the line in Missouri, were opened about twenty-five years ago, a short time before the beginning of operations at Cincinnati. There are still three or four mines in operation there. At Exline there have been three mines opened within the past five years. They are worked largely on the co-operative plan. The only work done here before this was in a small drift at Drakes switch, which is still worked occasionally in a small way. At Coal City on the state line is one railroad mine owned by the Manufacturers Coal and Coke Company, who opened it four years ago. In addition there are three or four local mines which have been operated fifteen years or more. The Manufacturers Coal and Coke Co. was originally organized to build the Iowa and St. Louis Railroad, by John W. Gates and other eastern capitalists. They opened a number of mines along the road. Later they sold the road to the Chicago, Burlington and Quincy but they still own under the corporate name given above mines at Coal City and Centerville. The company also owns property in West Virginia.

In addition to the above named places coal has been mined ever since the first settlement of the county at a place known as Hilltown in the southeastern corner of the county on the old Keokuk and Western Railroad. At present there are no extensive operations here.

Operations in the Appanoose field are not so remunerative as are those in some other districts. The thinness of the coal and the consequent necessity of removing the underclay are in part responsible for this state of affairs and the character of the coal also has an influence in the same direction. A shooting coal will yield about thirty per cent of fine coal which costs nothing except the handling and which can be sold for steam purposes. The Mystic coal, however, since it is mined for the most part on the longwall system and with little or no powder, yields only

about ten per cent of slack, and most of this has been used for steam for the machines. Hence there is no profit from this source and since the slack contains considerable clay and other impurities its value is still further impaired. The Mystic coal formerly sold for twenty-five to forty cents per ton more than other coals, but it now sells for the same price. It is only the extreme uniformity of the seam and its regularity of occurrence which enables the Mystic coal to compete in the markets with coal from those fields which have thicker deposits.

Wayne County. Although the Mystic seam is known to extend into Wayne county it has never been exploited to anything like the extent in this county that it has been to the east. The chief centers of activity have been Confidence, Promise City, and Seymour, all in the eastern part of the county. Coal was mined in the vicinity of Confidence for local purposes forty or fifty years ago, but no work has ever been done on a large scale. Mr. L. Frye has been the principal operator in this locality for the past thirty years and has opened several mines in the district. Mines were opened at Kniffin as much as thirty years ago and about 1884 operations were begun at Seymour by the Occidental Coal Company and Mr. Thatcher. The latter sold out in 1885 to H. W. McNeill of Oskaloosa. The mine of the former company was transferred to the Chicago Coal Company about 1890. From this time the principal operators were the Chicago Coal Company and the Seymour Coal Company until about 1902 the Numa Block Coal Company superseded them and has since been the largest producer in the county and indeed one of the leaders in the Mystic field. In recent years a few small mines have operated in the vicinity of Seymour, Harvard and Confidence.

Wapello County. Coal has been mined in the vicinity of the Des Moines river almost from the earliest settlement of the county. The high bluffs bordering the valley and the deep ravines opening into it revealed the rich stores of fuel to the hardy pioneers and they soon availed themselves of the opportunities thus presented. The county soon acquired a position among the leaders in the mining industry and has always held a high rank although superseded in late years by others whose production has shown larger growth. The earliest operations on a com-

mercial scale seem to have been conducted in the northwestern part of the county in the neighborhood of Eddyville and Kirkville. Near the former place mines were opened in Mahaska and Monroe counties as well as in Wapello. Worthen describes several coal banks as being in operation in 1857, among which were the Cooper mine near Dahlenega, the Roberts mine opposite Eddyville and the McCready bank on Bear creek, four miles west of Ottumwa. It is worthy of note that while a number of mines have been operated on Bear creek still more extensive work is being prosecuted here today than ever before.

Ten years later when White visited Wapello county he found that the centers of activity had moved somewhat. One of the principal operators then was C. Dudley and Company who worked a four-foot vein, south of the present station of Dudley and shipped over the Burlington and Missouri River railroad, now the main line of the Chicago, Burlington and Quincy. Another mine which played quite an important part in the development of the county was that of Henry Shock and Company, at Happy Hollow, three miles below Chillicothe. This mine also furnished a large amount of coal for shipment over the Burlington. In 1868, C. O. Godfrey of Hannibal, Missouri, and James Brown, an enterprising operator, formed the firm of Brown and Godfrey. They opened a drift mine four miles northwest of Ottumwa in a four-foot vein of coal about 100 feet above the St. Louis limestone. Coal was shipped from this mine over the Des Moines Valley railroad. Several other mines were in operation near Kirkville and Eddyville. At this time a large mine was being operated by the Alpine Coal Company at Alpine, two miles below Cliffland, on the Des Moines Valley railroad, under the direction of C. J. Love. The bed was from four to five feet thick and furnished large quantities of excellent coal for the Keokuk market. White states that up to the time of his studies about 1,000,000 bushels of coal had been mined here, a larger output, probably, than that of any other mine in the state at that time.

In 1871 the Union Coal and Mining Company was organized by Messrs. Brown and Godfrey together with a number of Boston men of capital, who were interested in the Burlington and

Missouri River Railroad. Mr. Godfrey was chosen president and Mr. Brown manager. About a year afterwards these two men organized the Watson Coal Company of Centerville. W. J. Ladd of Boston was the first superintendent of the Union company and was soon succeeded by William Haven who held the position until 1874. At this time Samuel A. Flagler took charge and held the position until the company was dissolved. This company took over the Shock and the Brown and Godfrey mines and operated them on a large scale. In 1872 they employed 300 men, who took out 77,000 tons. These mines were single openings ventilated by furnace whose draft was up an air shaft 400 or 500 feet from the entrance and which furnished air in a continuous current from entrance to exit. The fact that the furnace required attention would be manifested by two or three men coming out sick.

The product of the mines was taken on pit cars down train tracks to the railroad and the empties were drawn back by mules. No screens were used; the coal went to the market and to the railroads in the same condition in which it was mined—run of mine. The coal was largely undermined, and was frequently rib- or center-cut, so that a very small quantity of powder was used in proportion to that now required (?). Payment for mining and sales were made by the bushel and Mr. Haven claims the credit of being the first to introduce the plan of making settlements on the tonnage basis. Payments ranged from four to four and one-half cents per bushel and the unscreened coal sold for \$2.25 to \$2.50 per ton at the mine. The freight rates to Council Bluffs were made on the basis of \$45 for a ten-ton car, but were reduced a few years later when W. B. Strong was General Freight Agent of the B. & M. R. to \$35 per car. In 1870 the coal carrying equipment of the Burlington was 138 ten-ton cars, which was added to by the Union Coal and Mining Company furnishing 150 additional twelve-ton cars. The shipment from the mines of this company, in connection with the team trade, was seventy-five to 150 tons daily.

(An interesting development occurred at the Happy Hollow mine. After the vein had been worked into the hill 200 or 300 feet it began to pinch out. While sinking a well for company

use Mr. Brown encountered a six-inch vein of coal and the idea occurred to him to see what had become of it. So he sank a pit inside the mine and struck a six-foot bed of coal only twelve or fifteen feet below the one worked. The development of this necessitated a very steep grade to the pit mouth and so Mr. Ladd purchased a small mine locomotive, the first one used in the state. A competent engineer from the railroad was employed to make the trial trip, but on going down the grade the boiler flues were uncovered and on reaching the bottom the engineer had to draw his fires and the engine was pulled out by ropes. After this it was used for outside work. The opening of this lower vein stimulated prospecting in other mines and it was not long until unknown riches of mineral wealth were discovered and utilized. About 1876 the company sank another mine near the first. For a number of years this company was the largest operator in the county, but finally abandoned the field.

In 1879 O. M. Ladd opened the mines at Laddsdale in the southeastern part of the county. The camp is located in Davis county but the workings are chiefly in Wapello. The property is now owned by the Anchor Coal Company of Ottumwa.

In 1880 the Phillips Coal and Mining Company was organized and opened a mine two miles northwest of Ottumwa. This mine has been abandoned for a number of years, but the company, under the present name of the Phillips Fuel Company, have worked a total of six shafts in the neighborhood, near Phillips, or Rutledge. The same company are opening up a new mine on Bear creek. The year after the opening of the Rutledge mine the Wapello Coal Company began work at Kirkville and operated several extensive mines here. At one time they employed 435 men in their mines numbers 1 and 3. The vein was five to five one-half feet thick. Four or five slopes and shafts have been operated here but the last were abandoned in 1890 and the company moved to Monroe county and opened mines at Hiteman.

One of the large operators in Iowa has been the Whitebreast Fuel Company of Illinois. This company opened mines near Kirkville in 1887 and named the station Carver. These mines were worked on a large scale and a big tonnage was taken out for three years. The property was then bought by the Wapello

Coal Co., which worked it for two years and then abandoned it in 1892. Although the Union Coal Co. had supposedly exhausted its field the Whitebreast company in 1891 opened up a mine almost adjoining the Union property and operated it extensively for ten years. It was then sold to the Illinois and Iowa Fuel Co. and was worked out three years ago. This mine was located at Keb and was known as Whitebreast No. 22. It was one of the largest in the district, employing as many as 225 men and producing 1,000 tons or more per day. It was connected with the Chicago, Burlington and Quincy by a long spur and the entire output was sold to the Chicago, Milwaukee and St. Paul Railroad. Other mines have at different times been worked in the neighborhood of Ottumwa, some near Willard, and three or four local mines have been in operation at Eldon in the southeast corner of the county, since 1887. They are all comparatively shallow, ranging from sixteen to sixty feet in depth.

As the early mines were all drifts, along the Des Moines river drainage, they gave rise to the theory that the coal would run out under the hills and that none need be expected under the uplands. It was many years before this theory was exploded although when the early geologists were studying the coal prospects of the Des Moines valley they predicted that in time to come the uplands would be found to be as plentifully underlain with coal beds as was the area in immediate proximity to the river. Later developments have abundantly demonstrated the truth of this prediction as the mines at Rutledge, for example, bear testimony. These deeper shafts away from the river have shown that here the coal beds are as extensive and as thick as those bordering the valley, and that they are present in their original entirety while those exposed by the streams have by this very exposure been partly eroded and carried away.

In the early days of mining activity coal was much cheaper than at present and wages paid were correspondingly small. In the early 70's, when commercial mining really had its initiation, lump coal was delivered in Ottumwa for seven to eight cents per bushel, and brought five cents at the mine. Now coal sells for thirteen cents. Along with the increase in the price received for coal has come a corresponding rise in the wages paid. In-

stead of seventy cents per ton paid the miners of the early day ninety-five cents is now paid for lump coal. The inside day men who then were paid \$1.75 per day now receive \$2.56. The increases have followed the general advance in wages and in all lines of industry although the strong union organization has doubtless been effective in this direction as well as in others.

In the matter of equipment the Wapello county mines have ranked well with those of other districts. Tail-rope haulage has been installed in the larger mines, such as those at Whitebreast No. 22, the Phillips mines, Consolidation No. 9, near Eddyville, and others. Fan ventilation, steam hoist and safety appliances have added to the efficiency and economy of operation as well as to the safety of the employes.

Monroe County. Although Monroe has had fewer mines in operation than a number of leading counties, yet she has for many years held the supremacy as a producer and her average output per mine is probably larger than that of any other county in the state. The coal industry in Monroe county dates from the early sixties. White in his brief sketch of the geology of the county published in 1868 states that small mines had already been opened along Bluff, Miller and Avery creeks and that the Cedar mines west of Albia were producing coal. None of the mines at that time were scarcely more than country banks and operated chiefly during the winter season to supply the local demand. The first biennial report of the State Mine Inspector covering the years 1880 and 1881 contains some interesting statistics. Herein it is asserted that some thirty mines are in operation in Monroe county employing 638 men. The deepest shaft is reported to be 150 feet and was located near Albia. The total production for 1881 is stated in the report for 1883-'85 to be 98,143 tons. The U. S. Census reports, however, give the output for 1880 as nearly double this amount, namely 181,288 tons. At that time there were few shipping mines in the county and Monroe ranked below several counties which since have been far surpassed.

One of the first operators along the Burlington and Missouri River Railroad was L. L. McBride, who began operations on

Avery creek west of Fredericks about 1870. He opened a drift and later sank a shaft and finally sold out to the Union Coal and Mining Company in 1872. After working out the mine the company made no further attempts to develop the field although extensive operations by J. G. Evans in later years showed that it would have been wise to do so.

In 1872 or '73 a shaft was sunk on South Cedar creek just west of Albia on the north side of the Burlington by Mr. Rodifer. He introduced the idea of screening his coal, a source of much trouble in subsequent time. His screen was four feet long with one and one-half inch spaces between the bars. This mine was followed by extensive development in the South Cedar creek basin, which attracted the attention of the Wapello Coal Company. After prospecting this company opened up an important territory at Hiteman.

When the State Mine Inspector made his first report, in 1880, the principal mine in Monroe county was that of the Albia Coal Company. It was located three miles west of Albia, on the Chicago, Burlington and Quincy railroad and was a shaft mine using steam hoist. One hundred and sixty miners were employed and the mine had a capacity of 400 tons of screened coal daily. This mine was opened by Henry Miller and others in 1870. Another mine which was opened about the same time as the Albia was the Great Western, but it was abandoned after being worked a few years. One of the important mines of this district was the Iowa and Wisconsin, opened as early as 1885 and well equipped. A large business was done for ten years or more. Near by was the mine of the Chicago and Iowa Coal Company, which was one of the pioneer mines of the county and was equipped with good machinery and safety appliances.

While the Albia field was the first to be developed on a large scale it has not been exploited extensively for some years past. Most of the large operations have been north and south and west, a number of miles away. One of the more important of the early camps was near Avery, where the Avery Coal and Mining Company, the Smoky Hollow Coal Company and the Eureka Coal Company conducted extensive operations as early as 1880. The first two of these concerns used small engines for

hauling their output to the main line of the Burlington at Avery. Even in the early 80's a large part of the coal mined in Monroe was shipped over the various railroads—the Burlington, the Iowa Central and others. The Eureka mine was bought in 1885 by the Union Coal Company of Ottumwa. This firm had already been operating mines in this vicinity for years. The Smoky Hollow Coal Company is still operating mines, Nos. 6 and 7 being the only ones worked now. As many as 450 men have been employed by this company at one time.

In the same general district as these mines the Chisholm mine, near the village of the same name, was opened some time prior to 1887. It was operated under various managements until finally in 1892 it was bought by the Whitebreast Fuel Company and was put upon an excellent basis with modern equipment. The mine was operated until about 1898.

One of the earliest portions of northeastern Monroe, or indeed of any part of the county to be opened up, was Coalfield on the Iowa Central. Some years previous to 1873 Thomas Haight had been operating the Black Diamond drift. At the time this was one of the banner mines of the state and had a daily capacity of twenty cars. At this time ten tons was a maximum load for a railroad car. In 1873 or '74 the McNeill Brothers, W. A. and H. W., began mining at Millers creek, near Coalfield, but as the coal there was too thin for profitable mining, they removed to the Muchakinock valley in 1875. This was the first of the operations of these men who have since been among the foremost in the mining industry. The coal veins at Coalfield run not over four feet in thickness, but the quality, for domestic purposes, is scarcely excelled by any coals in the state.

Another important district is that about Hocking, Selection and Hilton. The chief company operating near Hocking is the Hocking Coal Company. This company has operated three mines. Shaft number 1 was put down and operations begun in 1899 while shaft number 2 was sunk during 1900. Both shafts are located on a low terrace along Coal creek, and are 180 and 208 feet in depth respectively. The company did a large amount of preliminary drilling so that the character and limits of the coal basin were pretty well understood. Mine number 1 was

abandoned about 1905 and number 3 was opened at the same time. These mines have been thoroughly equipped and have always ranked well in every respect.

At Hilton, a short distance south of Hocking, was mine number 10 of the Whitebreast Fuel Company. This mine was opened late in 1900 and speedily became one of the most important producers in the state. The surface equipment was excellent. Steel framework and corrugated iron sheathing were used exclusively in the buildings. The steel tippie was forty by sixty feet and was able to handle the output of 1,200 tons daily. Hoisting was accomplished by a pair of first-motion engines and the mine was ventilated by a force fan fourteen feet in diameter. The entire equipment and management were on the same excellent and substantial basis that characterized all the operations of this company. The mine was operated about five years and then on account of unfavorable market conditions and for other reasons it was abandoned.

A little farther south a shaft mine was opened in 1888 at Foster, on the Milwaukee railroad, by the Soap Creek Coal Company, in which the Phillips Brothers of Ottumwa were interested. The mine was thoroughly equipped with steam hoisting machinery and ventilating fan and it was operated for a long time, in fact it is still being worked, though from other shafts. It is now owned by the Phillips Fuel Company. A slope which was opened by the same firm a year or two after the shaft was mined longwall.

The Deep Vein Coal Company opened a shaft 208 feet deep at Foster in 1893 and operated on a large scale for a number of years. Mine No. 2 was opened about 1900. At one time over 200 men were employed by this company.

During the last few years the largest operators in Wapello and indeed in the state, have been the Consolidation Coal Company at Buxton and the Wapello Coal Company at Hiteman. The latter concern came to Hiteman in 1890 after abandoning their mines at Kirckville and have operated six mines to the west and northwest of the camp. The company own their own railroad running from the mines five or six miles to the main line of the Burlington at Tower 307, and operate their own loco-

motive. Mine number 1 was operated thirteen years. After it had been in operation only two or three years it had a capacity of 800 tons of lump coal per day and gave employment to 360 men and boys. Number 2 was opened in January, 1897, and was brought to a capacity of 400 tons per day within six months. The mine was abandoned in 1901, as it was never very profitable. The equipment at these mines was of the very best and it has always been the policy of this company to place and keep their mines on the highest plane of efficiency and then to work them to their limit. Mines numbers 3, 4, 5 and 6 are now in operation. Number 6 was opened up late in 1908. Former Senator L. H. Waterman is the manager for the company, a position which he has held for nearly twenty years. Next to the Consolidation Coal Company this company are the largest operators in the state.

The first biennial report of the State Mine Inspector, printed in 1881, states that unimportant openings had been made along Bluff creek and that a local supply was obtained during the winter months from these country banks. It was not until 1901 that the district became a real factor in the coal production of the county and in 1902 the basin became a most important mining community in the state. In 1900 and 1901 the Consolidation Coal Company founded the town of Buxton on the extension of the Muchakinoek branch of the Chicago and North-Western Railway and opened mine number 10 about two miles south of the town. Number 10 is 119 feet through the coal. The early history of the Consolidation company belongs with that of Mahaska county and will be given below. In May of 1901 number 11 was begun and it was opened in 1902. It is about a mile south of number 10. This is the deepest shaft the company have sunk here. It reaches the coal at 207 feet. Number 12, 182 feet deep, was begun in March of 1903, number 13, 100 feet deep, in July of 1903, number 14, 133 feet deep, in May of 1905, and number 15, 189 feet deep, was begun in October of 1908. All these mines reach the same vein, which is four and one-half feet thick. Mine number 14 is in Mahaska county. The mines of this company have all been equipped and managed in the best possible manner and they quickly brought Monroe into the lead among Iowa

coal producing counties. Mine number 10 is equipped with a steel tower which is said to be the highest in the state. It measures sixty-nine feet to the top. The hoisting arrangement is able to raise each minute four cars with 2,000 to 3,000 pounds of coal when running full capacity. All the mines of this company have electric haulage. That on the main entries is by the rack rail system and much of the gathering from rooms is by the third rail and trolley systems. Mines numbers 11 and 13 have been abandoned during the past two years. Mr. B. C. Buxton has been the manager of these mines for many years and has kept them at the highest possible stage of efficiency and economical operation.

Wages in the Monroe fields have advanced considerably during the past twenty years. At that time day men were receiving \$2.10 for eleven hours work, whereas at the present time they are paid \$2.56 for an eight-hour day. Prices of coal have increased accordingly. The increases are due chiefly to the general advance in wages in all lines of industry. The Buxton mines are worked almost entirely by colored miners, due to labor trouble a number of years ago before the present management took possession. The mines have been union since 1900. The miners are paid only for screened coal and so they will naturally use their powder to the best advantage in shooting the coal. In the early days coal was sold on the railroads by the car. The first track scales were put in at Albia and coal was then sold by weight.

Lucas County. Lucas county formerly contained the largest and deepest mines in the state. It was in this county where the first and almost only successful experiments in regard to the nature and capabilities of Iowa coal were carried on extensively. These investigations were made by the Whitebreast Coal Company, which operated largely in this county. The experiments were made with special reference to the determination of the adaptabilities of the various varieties of coal, their coking properties and the utilization of slack and coal dust. In regard to the latter, briquettes were manufactured in various ways, but it was found that with the methods used the coal dust could not be economically compressed and cemented for commercial purposes.

When St. John examined this region in 1867 he found a number of banks working the upper veins of coal in the northeast part of the county along the branches of Cedar creek, farther west along the Little Whitebreast and Whitebreast creeks and on English creek. These were all small affairs, however, and the first development of any consequence was undertaken by William Haven who in June of 1874 made a lease of lands belonging to Col. Byron O. Carr of Galesburg, Ill. These lands were eight miles west of Chariton on Whitebreast creek. After a year of endeavor Mr. Haven associated with himself Wesley Jones, J. C. Osgood, Louis R. Fix of Burlington and T. J. Potter, who were to furnish a limited amount of capital for prospecting purposes. These men organized the Whitebreast Fuel Company of which Mr. Osgood was president, and prospecting was carried on for some time. But after sinking a drill hole 138 feet it was decided to sink a five-foot shaft instead. It was the intention to use this for an air shaft if coal was found. This was the largest air shaft then known in Iowa. After many trials, troubles and tribulations, on January 16, 1878, five feet four inches of coal was passed through and thus began the career of the Whitebreast field, a field from which a greater tonnage has been raised in shorter time than from any other field in the state. The shaft was 250 feet deep and an eighty-horsepower engine was used for hoisting the coal. Tail-rope haulage was installed in 1882. Electricity was used for lighting the mine, the first installation in the state. When the Mine Inspector made his first report in 1880, 405 men and fifty-two mules were employed and were raising 640 tons per day. The quality of the coal was considered superior to that of any other then produced and it acquired a great reputation and an extensive market. Whitebreast number 1 was the first mine to adopt the plan of shot firing once a day. This avoided the danger of explosions when the men were in the mine and also kept the air pure for the men and mules.

In 1884 and '85 about 125 diamond drill holes were put down north and east of the Whitebreast mines. Conditions were unfavorable, however, and development in mine number three, the one farthest east, was so difficult that the Whitebreast company

abandoned Lucas county in 1891, after working out as much coal as possible from mines numbers 1 and 2, near Lucas.

In 1877 or '78, when the success of the original Whitebreast field became apparent, a shaft was sunk one-half mile east of Whitebreast number 1, by Daniel Eikenberry, a prominent lumber merchant of Chariton. The shaft was five feet in diameter and sixty or seventy feet deeper than the Whitebreast shaft, but it failed to show any favorable development and so was abandoned. In 1879 a number of miners employed by the Whitebreast company, together with some capitalists of Chariton, S. H. Mallory, D. Q. Story, D. M. Thompson and others, formed the Chariton Co-operative Coal Company and sank a shaft three-fourths mile north of the Eikenberry hole and northwest of the Whitebreast shaft. This shaft struck the lower vein at 330 feet, the greatest depth of any shaft in the state at the time. The co-operative feature was not very successful and a reorganization was soon effected by which the miners were eliminated from participation. The results were disastrous, however, for the reason that the otherwise capable business men, having no knowledge of mining methods could not properly oversee the work. As a consequence robbing of pillars and mining of coal too near the bottom of the shaft led to its partial caving in and put a stop to all operations in the immediate locality. This mine was well equipped; hoisting was effected by first-motion engines attached to a seven-foot drum and ventilation was afforded by a fourteen-foot exhaust fan. A great amount of water gave much trouble, although after a time pumps were installed which handled it effectively.

The opening of the Whitebreast field seriously interfered with the business of the Union Coal and Mining Company of Ottumwa and hence this company under the direction of its president, J. C. Peasley of Burlington, began an investigation into conditions in the neighborhood of the Whitebreast field. In 1877 they opened up negotiations with Mr. Knötts and finally acquired the Ladow shaft, which was seventy or seventy-five feet deep and reached an upper vein two feet thick. This they enlarged and deepened to 300 feet where the lower bed, over five feet in thickness, was penetrated. Under the direction of

S. A. Flagler the main entries were driven a few hundred feet north and south, chiefly south. Owing, however, to the great quantities of water which came through the sandstone roof it became necessary to abandon the enterprise after expending several thousand dollars in development.

The mine continued in this condition until in 1899 Hon. H. L. Byers, associated with several practical mining men, among whom were George Ramsay of Oskaloosa and Messrs. Shuler and Bates of Illinois, obtained possession of it. They cleaned and re-timbered the old shaft, pumped out the water and used it as an air shaft in connection with the main shaft which they sank about 300 feet west of it. They ran about a year and then transferred the property to S. W. White of What Cheer, afterwards of White City, and others. About a year later the mine again changed hands and Mr. Reed of Illinois and Mr. Byers managed it for two months, after which Mr. Moody of Kansas City secured part ownership. These men are the present owners but work has been discontinued since late in 1907 and the workings are filled with water.

There was one other important mine in the county; that of the Farmers Co-operative Coal Company at Zero on the eastern edge of the county. About 1878 a number of land owners organized this company and sank a shaft to the lower coal. After several changes in ownership the mine was finally operated under lease by the Whitebreast Fuel Company. Owing to the presence of numerous bowlders in the coal and to the great amount of water which entered the mine through the sandstone roof the mine was abandoned over twenty years ago. It has always been the experience in Lucas county that where the coal had a shale roof operations were successful, but where the roof was sandstone water has driven out the operators.

After 1891 Lucas county dropped from high rank to a low position as there was no further development of the lower veins until Mr. Haven resumed operations in the coal industry. He had sold his interest in the Whitebreast mines to Mr. Osgood in 1883 with the pledge not to engage in mining along the Burlington line for ten years. Upon being released from this pledge he associated with himself certain Ottumwa men in 1896 and began

diamond drilling and taking options on extensive tracts of possible coal lands on Little Whitebreast creek. This work resulted in the discovery of a field of 1,200 to 1,600 acres about three and one-half miles northeast of Chariton and again brought Lucas county to the notice of coal operators in the Iowa field. Among the first results was the return of the Whitebreast company who after considerable prospecting west of Lucas opened up a field known as Cleveland number 4, in the spring of 1899. The drilling was done with a one-inch core drill which was too small to show the presence of bony coal in the bed. The handling of this added to the expense of operation and cut it out of the domestic market, so that the mine was closed April 1, 1908. The mine had a steel tippie, motor haulage and excellent safety devices and had a daily capacity of 1,000 tons.

In the summer of 1901 Mr. Haven and others began sinking the shaft of the Inland Fuel Company and soon after sank an air shaft, both of standard size. Work has been confined principally to entry driving, so that at present nearly two and one-fourth miles of entries are open. No rock has been encountered and the mine is practically dry, as the only water which enters is what comes down the shaft from a thin vein of sandstone immediately above the seventy feet of roof shale. A Number 7 Cameron pump working one hour a day empties the sumps.

The persons who were interested in the Inland mine concluded that before bringing the coal into the market they would prospect extensively in north Lucas county. With this end in view they have had diamond drills in operation over five years and as a result five separate basins of coal five to eight feet thick and aggregating over 10,000 acres have been located. So far, however, nothing has been done towards the development of these pending the time of more complete ownership. In the meantime mine number 1 has been developed so that it can on short notice be brought to a production of 1,000 tons daily. The quality of the coal is excellent, as is shown elsewhere in this report, and in spite of the fact that it must be hauled five miles by team and thus must be sold at a considerably higher price than is charged for coal shipped into Chariton it is the coal almost exclusively used whenever it is obtainable.

Keokuk County. Although in recent years Keokuk county has dropped out of the list of important producers yet during the 80's and early 90's it ranked as one of the most important coal districts in the state. At the time of White's survey Keokuk was of no prominence as a producer, but when the Burlington, Cedar Rapids and Northern, now a part of the Chicago, Rock Island and Pacific Railroad, built in to What Cheer, a number of large mines were opened and a large output began. One of the earliest and largest operators was the Starr Coal Company. Their mine was equipped with steam hoist and railroad track scales and employed over 200 men. The capacity of the first mine was about 1,000 tons per day. This company operated three mines and in 1883 consolidated with a number of smaller operators in the district. In 1884 the Chicago and North-Western Railroad Company built a branch line from Belle Plaine through What Cheer to Muchakinock and thus gave the district an outlet to the north. At this time there were twenty mines in the county, eleven of them at What Cheer. In 1886 and '87 the mines of the Starr Coal Company and the Granger Coal Company were acquired by the What Cheer Coal Company. At the time of the consolidation over 1,100 miners and laborers were employed in the mines concerned. Mines were operated by this company in the vicinity of What Cheer and to the north of it until 1899. They were equipped with the best machinery; Harrison mining machines were in use, and fans were used for ventilation. The company operated a total of twelve shafts of which number seven were acquired at the consolidation and five were sunk subsequently.

Another of the large operators was the Crescent Coal Company. This company took over two mines in 1885 and worked them for a number of years. In 1894, after these had been exhausted, two mines were sunk northwest of What Cheer. Number 4 was for several years the best producer in the county, but was abandoned in 1901.

Among the local mines have been a number of quite important producers. Thomas Thompson has been operating near What Cheer since 1893 and the Pioneer Coal Co. operated in the vicinity of Thornburg and What Cheer from 1889 to 1897. A number

of mines have also been worked in the neighborhood of Delta, Sigourney and Richland. At present there are only a few local mines in the county and these are all located near What Cheer.

Mahaska County. This was one of the first counties in which coal was known although for some years not much use was made of it. As early as 1843 the farmers knew of the presence of coal but none was used for some time except by the blacksmiths, who found it convenient for their forges. When Owen made his trip up the Des Moines in 1847 Mr. Morgan was working a four-foot bed in the bluffs of Muchakinock creek three miles above Eddyville. It was not long after this that Robert Seevers opened a bank east of Oskaloosa, for he came here in 1853 and began mining soon after. John and James Burdess also opened a mine near Beacon in 1862. The Seever mine was opened in a valley three or four feet below the bed of the creek and struck a four-foot bed of coal. This, like all the early mines, was a drift where the coal had been exposed by erosion. These mines were begun before there was any railroad in the vicinity and hence their trade was local. Later other mines were opened around Eddyville, Pekay, etc., and showed that the coal lay in basins. There was a thin vein of cannel coal found near Oskaloosa and a heavy vein near Given, which runs out into the Des Moines river. A wide "fault" has been located running north-east-southwest under Oskaloosa, and several mines have run into it from both sides.

By 1867, at the time of White's investigations, a number of mines had been opened up. In the north part of the county a four-foot bed of coal was being mined, along Spring creek near Oskaloosa were a number of banks and at Oskaloosa Station, now Beacon, on the Des Moines Valley railroad, two and a half miles from the city, the thickest coal bed then known in the state was being worked. This seam measured from five to nearly eight feet of good and solid coal. The principal operators were Messrs. Roberts and Co. and the Iowa Coal Co. of Keokuk. Their mines had car tracks laid from the station platform of the railroad directly into the rooms so that the mules pulled the loaded cars from the face to the station, where the coal was dumped into cars for shipment. White further states that these

mines shipped daily 2,500 bushels of coal "besides a considerable quantity of coke, of good quality, which they have lately commenced preparing for shipment."

Several other openings had been made at this time, near Given, where the Iowa Coal Co. had mines, and all along Muchakinock creek down to Eddyville were small drifts. In conclusion White makes the prediction that "There is no reasonable doubt that the whole ridge between the creek before named (Muchakinock) and the Des Moines river is underlaid by at least one good bed of coal, and indeed it is quite as conclusive that the higher lands of the greater part of the county are so underlaid." While this has proven to be true Muchakinock valley has been from the earliest times the seat of the greatest activity in the county.

The next move in the development of the coal fields was made by Messrs. W. A. and H. W. McNeill, of Oskaloosa. These men, after abandoning their mines in Monroe county, moved to the Muchakinock valley in the spring of 1875. They incorporated under the name of the Iowa Central Coal Co., opened up a six-foot vein five miles south of Oskaloosa and ran in a siding from the Iowa Central railroad, which had built up the valley in 1873. A year or two later the firm reorganized under the name of the Consolidation Coal Co. and absorbed another mine which was being operated in the valley by Messrs. Huggings and Bonifield of Ottumwa, also the Black Diamond mines of Coalfield, Monroe county, and a mine just west of Beacon known as the Eureka mine which had been opened by Mr. Evans of Beacon. The consolidation made this company the largest in the county. In 1878 they had 400 men in their employ.

This company continued the operation of the above mines until 1880, at which time the Chicago and North-Western Railroad Co. bought it. The mines were operated by this company under the management of J. E. Buxton until their exhaustion in 1890 when the camp was moved to Monroe county. The headquarters were at the camp of Muchakinock where the stores and offices were located and around which were the early mines. Nine mines were worked here, of which number 9 was the first to have electric haulage. The rack rail system was used. About

a year before the North-Western assumed control the previous management had trouble with the union and shipped in colored miners. These have been employed by the company ever since. The white miners were chiefly Hungarians and Swedes.

That the question of car supply is not one of recent origin is shown by an experience of the original Consolidation Coal Co. In 1875 the output of the Black Diamond mines, 100 tons per day, was considered somewhat phenomenal and was about the largest in the state. But a few years later the question of supplying empties to the different mines arose and the railway, in order to determine the needs of the different mines, advised the owners that each mine, in its turn, would be furnished all the empties it could load in ten hours. When the turn of the Consolidation company came they tried to convince the train dispatcher that he was not giving them a large enough supply. In spite of his assurance to the contrary they were compelled to stop loading at three o'clock after having loaded their quota of 100 cars with lump coal. Cars of that day had a capacity of ten tons.

While the McNeills were operating so extensively a number of other mines were being opened in different parts of the county. Chief among these were the Acme and the Standard, both within the corporate limits of Oskaloosa. After the sale of the Consolidation the Messrs. McNeill, together with Ezekiel Clark of Iowa City and J. K. Graves of Dubuque, organized the Western Union Fuel Co. and bought both of the above mines, which they worked for a few years, until their exhaustion.

In the meantime the McNeill Brothers had, in 1884, organized the American Coal Co. and had taken over two mines at Evans, on the Chicago, Rock Island and Pacific railroad, the old Des Moines Valley. These mines had been opened by Evan Evans of Beacon and Wesley Redhead of Des Moines and had a combined daily output of 100 tons. On account of its not being properly cleaned the dealers had refused to handle the coal with the result that the mines were practically idle. By properly cleaning the coal the new management were able to convince the Railroad Co. and the trade that the quality was really high, and after closing one of the mines they pushed the other up to

a capacity of 1,000 tons per day. This mine and others in the vicinity were operated by the McNeills until with the sale of the American Coal Co. in 1901 to Messrs. W. T. Phillips of Oskaloosa and Harry Burkes of Montreal, Canada, they dropped out of the mining industry in Iowa.

During these years John Burdess, who had been one of the pioneer operators, was still carrying on the work near Oskaloosa. He operated until 1888 when his mine was purchased by the Oskaloosa Coal Co. The Iowa Coal Co. also continued operating in the Muchakinock valley until into the 80's when the Beacon Coal Co. acquired their property. During the early years of mining activity in the Muchakinock valley Beacon was the largest mining town in Iowa but by 1885 its importance had so decreased that there were only a few mines at work in a very small way.

About 1875 or '76 the Chicago, Milwaukee and St. Paul Railroad Co. opened up a mine at Excelsior, about three miles south of Oskaloosa. Three mines were operated, under the name of the Excelsior Coal Co., and reached a capacity of 1,500 to 1,600 tons a day. Finally the supply was exhausted and the plant was moved to Carbonado, three miles east of Oskaloosa, in 1890. At these new mines self-dumping cages and quick methods of loading box cars were installed. They were operated until 1898 when the coal became exhausted and the company abandoned mining operations in the county.

The Oskaloosa Coal and Mining Company was organized in 1888 and operated four mines near Oskaloosa. These are all worked out and the company ceased operations in 1905. It ranked among the largest producers of the county.

Several mines were opened in 1890, among them that of W. A. Hoover, at Carbonado, on a switch from the Iowa Central. A double hoisting engine raised coal from a six-foot vein, but as the field was limited the mine closed after two years of work. Another mine which was opened in the same year was the Garfield mine of Geo. Ramsay and Sons. This had connections with the Rock Island and Iowa Central railroads at Beacon, and soon reached a capacity of 600 to 1,000 tons. Tail-rope haulage was used underground. The same firm also opened two mines near

Knoxville Junction, or Evans, one of which is still in operation.

In 1892 the Whitebreast Fuel Co. opened its mine No. 28, at Pekay and rapidly brought it to the front rank. Five feet of coal was found at a depth of ninety-six feet and 275 men were employed to furnish an output of 700 tons and more daily. The mine was worked until 1906 when it was abandoned. At present this company operates no mines in Iowa.

In 1895, the Lost Creek Coal Co. established a camp at Lost Creek and sank a mine, with a private road from the camp to the Iowa Central and Burlington and Western, now the Chicago, Burlington and Quincy, railroads. The company operated three mines which were very important producers. Within a year from the beginning of operations 215 men were employed. The mines were abandoned about 1906.

The extension of the Chicago and North-Western railroad across the Des Moines river and into the Buxton district in 1900 gave a great impetus to mining in the southwestern part of the county. W. S. White and other What Cheer operators transferred the Crescent Coal Co. from What Cheer to Oskaloosa and opened extensive mines at White City. The Rex Fuel Co., also composed of What Cheer men, located near Bussey. Mines were opened at Lakonta near Buxton and at Eveland. Other mines have been opened west of Oskaloosa by the Garfield Coal Co., the Bolton-Hoover Coal Co., and others, and numerous mines, of greater or less importance, have been opened in nearly all parts of the county.

Mahaska early took a prominent place among the coal counties and for many years held first rank. From 1883 to 1900 she consistently yielded over 1,000,000 tons annually and was the only county to reach this mark. In 1901 Polk and Monroe surpassed her and she has since declined to fourth place although in 1908 she was one of the few leaders to show an increased output over the preceding year.

During the period of Mahaska's greatest activity the price paid for mining coal did not vary greatly from seventy-five cents per ton, for lump coal. The size of screens was, in early years, determined by the miners and operators at each mine. Later screens with a space of one and one-fourth inches between bars

have been the standard. The men were paid once a month, generally on the Saturdays nearest the twentieth of the month. At present the practice of semi-monthly payments is in common use.

Marion County. It has long been realized that the coal beds of Marion county were among the most extensive in the state. But in spite of this the county has never ranked very high as a producer. Only once previous to 1902 did the output exceed 200,000 tons and never has it approached very close to 400,000 tons. This is due not to the lack or poor quality of the coal nor to the difficulty of securing it, but to the comparative lack of transportation facilities. The largest producers today, the Mammoth Vein Coal Co., are served by a switch over seven miles long, and with this exception the two southern tiers of townships do not have a railroad save along the northern and eastern borders. However, coal has been mined in a small way for over sixty years and in recent years some quite important mines have been opened within the county. When Owen was in Iowa he noted that in section 16, Liberty township, was a five-foot bed of good coal, which could be used for working cast steel. This is in the same locality as the beds since exploited so extensively by the company mentioned above. Nine years after, in 1856, Worthen found a small bank working in a bed of coal up to seven feet thick, on the south bank of the Des Moines river in Polk township. This was at a village called Coalport and here the first mines of any consequence were opened, for in these days when steamers passed up the river this village was one of the most important coaling stations between Eddyville and Des Moines. With the cessation of navigation, however, these mines, which had before been operated at a profit, were closed down, and now only a few old buildings mark the site of the once prosperous village. It is not even given a place on the modern maps.

After this very little was done until the late 60's. Then when White came into Marion county in 1867 he found quite a number of banks opened up near Otley, Pella, Knoxville, Marysville and elsewhere. He noted that a mile above Marysville Jacob Kline

had opened a mine in which the coal had a thickness of ten feet, although it was seen to be divided by a thin clay parting three feet from the top. This is evidently the Mammoth Vein. Almost every tributary of the Des Moines had exposed beds of coal in its banks and many of these were being utilized for a local trade. The beds exposed along English creek were being vigorously exploited and the successors of these pioneers today are finding the deposits no less valuable.

When the State Mine Inspector made his first report, in 1881, he found that the chief mines then in operation were Flagler No. 5, owned by the Union Coal and Mining Co., the Oak Hill mine, also near Flagler, and the mine of J. T. James and Co. of Knoxville. The Union Coal and Mining Co. opened up mines near Flagler about 1870. The mines were connected with the Chicago, Burlington and Quincy railroad and were among the most important in the county. Number 5 was a drift, opened in coal so high that mules of ordinary size were employed for haulage. Railroad scales were used for weighing the screened coal. Forty miners were employed and 130 tons per day were raised. In 1887 the company installed new mine cars with a capacity of one ton. The mine was worked until about 1888. The Oak Hill mine was also a drift in coal eight and nine feet thick and had a capacity of 125 tons daily. Mine cars holding 1,000 pounds were used.

About 1883 the Red Rock Coal and Mining Co. bought 4,000 acres of land near Dunreath and prepared to install one of the largest mining plants in the state. But the land was bought without thorough prospecting, on the old theory that the coal lay in extensive beds and that an exposure in the bluffs indicated a widespread deposit. Hence the enterprise never materialized.

The Whitebreast Fuel Co. also operated two mines in this vicinity. One of these was located at Flagler. It was a slope known as No. 11, and employed the tail-rope system of haulage. The other mine, No. 7, was a shallow shaft, located at Swan, in the northwest corner of the county. The equipment was of the highest order in accordance with the practice of the company. It was operated only two or three years and was closed in 1888.

During this time, however, it was an important producer and as many as 285 men were employed. Number 11 was abandoned about 1892, as the coal, which was in a lenticular basin and was fourteen feet thick centrally, thinned in all directions until it became too much attenuated for profitable mining. Both mines shipped all their output over the Chicago, Burlington and Quincy railroad.

Other important mines in the county were the Black Swan, at Swan, operated by Thomas Beck of Des Moines; the Black Diamond at Dunreath; the Otley mines of the Marion County Coal and Mining Co., and the Morgan Valley mine of the Midland Coal and Mining Co. These were all shipping mines and in addition local mines were operated in every township of the county.

By 1898 the scene of greatest activity had moved to the vicinity of Hamilton and Bussey. For a long time there had been mines in the vicinity and by 1891 J. A. Powers was operating the Bussey mine. He carried on extensive prospecting in Liberty township and finally the Mammoth Vein Coal Co. was organized about 1903 and succeeded the O. K. Coal Co., which had been operating in the region. Mr. Powers is president of the new company. Eleven mines have been worked near Marysville and are connected by a long switch with the Wabash railroad at Tracy, seven miles distant. Mr. Powers also owns a mine at Hamilton which was opened in 1902 but was discontinued for some years. It is now being prepared for reopening with a new shaft by which coal will be removed from the old workings. The Mammoth Vein Coal Co. are at present the largest operators in the county and one of the largest in the state. The English Creek Coal Co. which sank their mine near Flagler in 1906 are also among the important producers of the county.

Jasper County. The presence of coal became known to the pioneers of Jasper county in 1847 when it was discovered cropping out in the valley of Coal creek on the farm of Hugh Patterson. It was found also near Vandalia soon afterwards. About eight miles west of Newton on Skunk river, coal was mined in a fairly extensive way at Slaughter's coal bank in 1857 when Whitney studied the geology of Central Iowa. The bed was about four

feet thick and the coal was not thought to be of very high quality, although in later years it acquired a high reputation. The slope was operated until 1895. Earlier than this Owen had mentioned the use of coal for blacksmithing purposes from a three-foot seam near the Skunk river.

While mining was carried on from early years in a desultory sort of way it was not until the 70's that work really began on a commercial scale. The first shipping mine in the county was the Watson No. 1, opened four miles east of Colfax and three miles south of the Chicago, Rock Island and Pacific railroad, with which it was connected by a long switch. John Aberheardt was president of the company and James Miller superintendent. The mine had a large output and was sold after a number of years to C. F. Godfrey and Co. Two years after the opening of Watson No. 1, the Couch mine of the Jasper County Coal and Railway Co., three miles south of Newton, was put in operation and shipped over the Monroe branch of the Rock Island. When the State Mine Inspector made his first report this mine was the largest in the county. Its main entries had been driven in 2,000 feet and seventy tons per day were being brought out. Steam power was used for hauling coal out of the slope. D. S. Couch, part owner and superintendent, was interested in Jasper county mines for a number of years. In 1881 he bought an extensive tract of land three miles above Colfax on the South Skunk river, ran a switch known as the Northern Railroad out from the town, and opened up an extensive slope. Soon after this several other mines were opened here by the Standard Fuel Co., the Vulcan Coal Co., the Black Heath Mining Co., and others, and the Chicago Great Western Railroad Co. built a switch from their line at Valeria to provide a northern outlet for these mines. From 1887 to 1893 the Jasper County Coal and Railway Co. operated several quite important mines at a camp named Draper, a few miles east of Monroe. These were among the few mines in the county which were worked longwall. After 1893 they were worked in a small way by Robert Marshall, until 1897. From 1881 to 1900 the Jasper County Coal and Railway Co., later the Jasper County Coal Co., operated a number of mines on the property north of Colfax which Mr. Couch,

its former superintendent, had bought. Then, after extensive prospecting it located shaft No. 5 three miles south of Colfax and built in a line of railroad to connect with the Iowa Northern at Colfax. As the company had acquired the branch of the Chicago Great Western from Valeria it now had connections with both the Rock Island and the Great Western, which opened up a splendid market to the north and east. In 1900 the company sank shaft No. 6, which was equipped with the latest and most approved machinery, including a Christy box car loader. Two hundred and seventy men were employed at this mine. Mine number 5 was abandoned the same year after mining out fifty to sixty acres of coal.

At the same time the Colfax Coal and Mining Co., organized in 1899, had sunk a shaft sixty feet deep two miles east of the Jasper county mines and the railroad, now the Colfax Northern, was continued to their mine. This field, southeast of Colfax, soon proved to be the most productive area of Jasper county and has been developed more vigorously than any other part of the county. With its exploitation Jasper county emerged from the comparative quiescence of the few years preceding and again became an important producer.

In 1902 the Colfax Consolidated Coal Co. was organized by a consolidation of the two companies above mentioned. This concern has since operated three mines in this field; mine No. 6 of the Jasper County Coal Co., No. 1 of the Colfax Coal Co., which is now No. 7 of the present company; and No. 8, which was opened in 1905. This is one of the largest and best mines in the state, is equipped with electric lighting and haulage in the main entry and has an installation of the most modern machinery. The camp of Seevers, which was built originally by the Colfax Coal and Mining Co., is located between Numbers 7 and 8 and furnishes accommodations for a number of the miners.

One of the earliest operators in the county was William Snooks, who opened a shaft near Newton in 1886 and has operated here continuously ever since to supply the local trade. Newton is the oldest district in the county and has produced a great deal of coal during its history.

The Warrick Brothers operate a slope near Colfax and have been supplying a local trade since 1903. The Diamond Coal Co. has been supplying the Industrial School at Mitchellville since 1905. There have been a large number of other operators who supply a local trade.

During the last twenty years wages have advanced somewhat, in line with the general trend of business. In the 80's the price of mining was seventy-five cents per ton in summer and eighty-seven and one-half cents in winter. At present ninety-five cents is paid in the Oskaloosa district and \$1.00 in the Des Moines district. Formerly the operators could sell to the railroad at fifty cents above the mining price but they cannot do so now. Although selling prices have advanced in recent years coal is sold at closer margins than formerly due to the increased costs of mining.

Polk County. The discovery of coal in this county is credited to the soldiers stationed at Fort Des Moines. The exact date of the discovery does not seem to have been recorded, **but** it was about 1840. The soldiers dug coal from the vein **still** exposed in the river bank near the Center street dam, and also near Barlow Granger's, south of the Coon. The coal was used first by the blacksmiths at the Fort. In 1843 Captain Allen and A. N. Hays opened a coal shaft and stone quarry on the banks of the Des Moines, but the coal was in very slight demand as wood was plentiful. One of the earliest transactions in the coal industry occurred in April, 1847, when A. D. Jones presented a bill for eighty-eight bushels of coal furnished the county clerk. The bill was refused, however. What recourse Mr. Jones had is not stated.

There was very little coal used in the county until 1865. It was gathered here and there along the bluffs in wheelbarrows and dumped into wagons. Thirty bushels were called a load, without weighing. Mr. Wesley Redhead, realizing the need of intelligent prospecting and development, organized a coal company in November of 1864 and began the first systematic mining. In August of the next year Mr. Redhead, in company with a number of other men whose names are well known in local history, organized the Des Moines Coal Company and opened

up a slope north of town on the west side of the river. This was operated a number of years until the pocket became exhausted. Then in January of 1873 Mr. Redhead, who had bought out the interests of the other members of the firm, began prospecting on his land west of South Park near the south end of the West Seventh street bridge. Mr. Redhead was convinced that coal occurred below the upper vein which was being worked, and having employed John Gibson as foreman, he began drilling. After penetrating three thin beds of coal and a dense limestone layer a five-foot bed of coal was reached on June 2d at a depth of 150 feet. The Black Diamond mine was at once sunk and equipped with the best machinery available, including a boiler and two horizontal engines. Forty men were employed in a short time, and a branch was run from the Indianola railroad. In 1867, when the Chicago, Rock Island and Pacific railroad was built to Des Moines, the Des Moines Coal Company was producing one or two cars per day, but by 1876 twenty car loads per day were being furnished and 150 men were employed. The name of the company was changed in 1874 to the Pioneer Coal Company and the mine was given the same name. It was one of the most important in the district and worked out a large area.

Two years after the Des Moines Coal Company began work the Watson Coal Company was organized and sank a shaft on East Fifteenth street by the Rock Island tracks. A number of the officers and directors of this company were from the east. The same company operated mines at Centerville. It was one of the largest operators in Polk county, and from June 1, 1875, to June 1, 1876, mined 1,113,967 bushels which were sold for \$100,257.

In the autumn of 1867 Messrs. A. Y. Rawson and Vincent sank a shaft near the old Des Moines Coal Company's workings and the next spring Thomas and Joseph Beck opened a shaft near Mercy Hospital. After operating for a year they sold it to T. D. Yeoman and Dr. Howe, who ran it for a year. During this time Thomas Beck opened the Eclipse mine on the south side. The Eclipse Coal Company was organized October 1, 1873, with T. D. Yeoman as general manager and Thomas Beck as mine superintendent.

The Eureka shaft, also on the south side, was opened by Messrs. Story and Davis in 1871 and a few years later the Eureka Coal Co., of which Norman Haskins was president, took possession and installed new machinery. This mine was worked for over twenty years. In 1874 Messrs Clark and Sypher sank a mine, later known as the Polk County, on the Indianola railroad a mile and a half from the Courthouse, and in 1875 it was bought by John Gibson. He operated it for several years and later sold it to Wesley Redhead, then he commenced working east of the Capitol. A number of other mines were worked in the 70's, most of them on the south side, with two or three on the east side and as many north of town. Only a few small drifts were worked east of the Capitol previous to 1870. By 1876 about 500 men were employed in the mines and 150,000 tons were produced annually, about one-half of which was shipped. Nine to ten cents per bushel was received for export coal and thirteen to fourteen cents for that sold locally. Some of the larger mines employed steam hoist and mule haulage was in general use underground. About 1870 the office of County Inspector of Mines was established in Polk county and Mr. Beadle was appointed the first inspector. He occupied the position for two years and was succeeded by Daniel Rees. The office was continued for about three years and then seems to have been abolished.

In 1879 George Garver and John Walters began mining in east Des Moines and sank two shafts within a short time. These were Giant numbers 1 and 2, located at Sixteenth and Walker and Twentieth and Grand respectively. They were among the largest of the early mines on the east side, a locality which was to play a very important part in the mining industry of the county. In a few years Mr. Garver with other men had opened several other mines in different parts of town, among them the Garver mine, the Des Moines Coal Company mine and others. In later years Mr. Garver's sons, Henry F. and C. M., have been associated with him and at present are the active members of the Enterprise Coal Company. During the early 80's most of the mines were working the "first" or "second" veins. Only a few had sunk to the "third," among them the Eureka and

Giant number 1. Prospecting was done with churn drills. Few of the mines had advanced beyond the furnace method of ventilation. The Pioneer, the Eclipse and the Giant mines were among the first to install fans. Miners were paid \$1.25 per ton for their coal, drivers received \$1.75 per day and common laborers \$1.50 to \$1.60.

It was not until about 1885 that the industry began to extend much beyond the corporation limits. About this time the Walnut Creek Coal and Mining Company opened a mine four miles west of Des Moines on a narrow gauge railroad running north from town, the Altoona Coal and Mining Company sank a shaft at Altoona on the Rock Island, and the Wabash Coal Company and Runnells Coal Company began work at Hastie and Runnells respectively on the line of the Wabash railroad. At that time the Altoona mine was the deepest in the county, reaching a four-foot vein of fairly hard coal at 211 feet. A year or two later the Polk City Coal Co. opened a small shaft 238 feet deep at Polk City to supply the local trade. This was one of the few mines in the county that was worked on the longwall plan. On the south side the Coon Valley, opened in 1879, and later the Manbeck mine, both superintended by Thomas Beck, were doing an extensive shipping and local business. Mr. Beck has been an active operator in this field for over forty years. From this time on mines were opened in all directions. About 1890 the Bloomfield Coal Company began work just north of Des Moines and the Maple Grove Coal and Mining Company was organized and opened a mine northeast of town.

By 1893 there were twenty-three mines in operation. Of these twenty were shipping mines and eighteen were using steam hoist while all but two were using mule haulage underground. The two exceptions were the J. M. Christy and the Eureka Coal Companies, which used tail-ropes below. The financial stringency of that year affected the industry to a considerable extent, as the local demand, both industrial and domestic, was materially reduced and consequently outside markets had to be sought and coal sold at a lower price. Instead of the operators receiving \$1.75 to \$2.00 per ton at the mines they were forced to sell to the railroads at \$1.25 to \$1.50. Of necessity the prices paid

for mining were diminished accordingly. Nevertheless there were several important producers opened about this time, among them the West Riverside Nos. 1 and 2, Keystone Nos. 1 and 2 and Gibson number 2, the latter located four miles east of the Capitol. Other operators who began about this time and who are still prominent are the Flint Brick, Eagle, Saylor and Evans. At the same time the Merchant mine was opened up at Commerce and was worked longwall.

During the closing years of the last century the larger mines of the county were located some distance from the center of population along the different lines of railway. To the east, on the Rock Island, were the Christy, employing 235 men; the Carbondale, five miles east of Des Moines, employing 225 men; the Gibson No. 2, east of the Carbondale and giving employment to 100 men. To the north, on the Chicago and North-Western, were the Des Moines Coal and Mining Company mine at Marquisville, at which 275 men were working, and the Saylor No. 1, at Saylor, one of the best equipped mines in the state. Northeast of town on the Chicago Great Western railroad was the Maple Grove number 2, where 90 men were employed. The numerous local mines of the county have always ranked high in their equipment and their output, as they supply a large domestic and steam trade and compare in size with many of the shipping mines. Some of the mines were equipped to handle a daily output of 1,000 tons. In the biennial period ending June 30, 1901, there were employed in and about the mines 1,770 men, who were paid wages amounting to \$2,007,360. During this same period there were produced 1,800,000 tons of coal. It can be readily seen from these statements what a large growth the mining industry enjoyed in the quarter of a century subsequent to 1876. During more recent years a number of very important mines have been opened. The Des Moines Coal and Mining Company opened up two large mines at Enterprise in the northern part of the county, the first in 1903 and the second in 1907. The mine at Marquisville was abandoned after a serious fire had stopped operations, and the company assumed the name of the Enterprise Coal Company. The Evans mine has been worked by the Norwood Coal and Mining Company for the past eight

years, and the Smith-Lowe Coal Company have operated the old Carbondale mines during the same period. The Gibson Coal Company abandoned its mines east of Des Moines and opened Number 4, two miles west of Altoona, in 1902. This was worked out and abandoned a year or so ago and a new mine has been developed near Clive, just west of Des Moines. The Maple Grove Coal Company has changed its name to the Maple Block Coal Company and has opened mine number 2 northeast of Des Moines. There are also a number of new mines which are described elsewhere in this volume.

In the matter of equipment the mines of the county take rank second to none. This will apply to the local as well as to the shipping mines. Of late years all have had steam hoist and fan ventilation, with one or two exceptions, and the top works are modern and adequate for the heavy demands made on them. With the exception of the Commerce and Polk City mines all have been worked room and pillar. Machine mining has never been in general use. Machines were installed at Runnells and at Morgan Valley, just over the line in Marion county, sixteen or seventeen years ago, but were not very successful. Another attempt was made to put them to service at Carbondale about twelve years ago with the same results. They are being used at present in a few mines within the county. Electric haulage has had a similar experience. Few plants have been extensive enough to make its installation advisable or its operation profitable.

Dallas County. Although Dallas has not until very recent years yielded a large output of coal, she has during most of her history been a consistent producer and has contributed a not inconsiderable quota to the state's total. For over forty years coal has been mined from the banks and bluffs of her streams and in a number of cases deep prospecting has revealed the presence of greater and better stores of fuel. By 1867, at the time of St. John's work in western Iowa, coal was being removed from a bank just below Redfield on the lands of J. W. Redfield. The coal was nearly three feet thick and was of fair quality. Some coal was also furnished for blacksmith use from the Marshall coal near Van Meter, but the bed did not exceed six inches

in thickness. Two miles above Redfield the Panora coal was being utilized to some extent at the Parker and Piatt mines, although this vein also did not exceed six inches in thickness. A few miles north of these mines, along the middle Raccoon, the Lonsdale coal, here eighteen inches thick, was being mined in a small way by stripping. North of Adel a few miles a thin bed of coal had been worked for a number of years, and on Walnut creek, in the eastern part of the county, the Marshall coal had been opened to some extent. These examples show that the value and extent of the coal beds were already appreciated although nothing seems to have been known of deeper veins.

By 1878 the Chicago and Van Meter Coal Company had sunk a shaft to a three-foot vein at a depth of 256 feet. In 1879 the engine house burned down and entirely new machinery was installed. Steam hoist was used and machines driven by compressed air were employed for cutting the coal. This was the first deep mine in the county and for some time was the only one of consequence. It was opened by Messrs. Boag and Van Meter, but Messrs. J. L. Platt and J. M. Thompson acquired it soon after. At first both room and pillar and longwall methods of mining were used, but by 1883 the longwall method obtained all through the mine as it proved to be more profitable in the thinner veins of western Iowa. In 1879 fifty men were employed and 1,000 bushels were raised per day. Lump coal sold at nine cents per bushel and nut for eight cents. The Chicago, Rock Island and Pacific Railroad used twenty-four tons daily and the remainder of the output was shipped westward or sold locally.

About 1893 the Platt Pressed and Fire Brick Company was established and the plant built close by the Van Meter mine. The two were worked in co-operation and the clay for the plant was taken from between the first and second veins of coal. In later years the entire output of the mine was used at the brick plant. The mine was abandoned in 1902.

During these early years Calwell's slope at Redfield was employing sixteen men and 350 bushels were being mined per day from a three and one-half foot bed of coal. Quite a number of shafts were in operation around Redfield in the 80's and some coal was being mined near Bayard and Linden. In 1870 Frank

West of New York had begun prospecting in Des Moines township and finally sank a forty-foot shaft in section 14, not far from the location of the leading mines of Dallas county today. In 1886 a new field was opened up at Dawson, in the extreme northwest part of the county. Here the Dawson Coal Co. sank a seventy-six foot shaft a few hundred yards from the Chicago, Milwaukee and St. Paul railroad. This reached an upper vein and the company at once sank a larger shaft to a lower four-foot vein at 160 feet. Steam hoist, fan ventilation and self-dumping cages were used, ninety miners were employed and most of the coal was sold to the railroads. The mine was an important producer until 1901.

About 1901 the Carpenter Coal Co. sank a mine between Madrid and Woodward, one and one-half miles south of the Milwaukee railway. This plant was equipped with electric mining apparatus, modern machinery and had good shipping facilities for reaching a northwestern market. It immediately assumed a position in the front rank of producers in central Iowa.

At this same time the Reese Brothers Coal Co. sank two shafts in the neighborhood of Madrid and equipped them with steam power. From this time on Madrid assumed an increasing importance as a mining center, although Hutchinson Brothers, the Dawson Coal Co., operated an important mine two miles west of Dawson. In the fall of 1906 the Carpenter Brothers, under the name of the Scandia Coal Co., opened a large mine at Scandia, and the High Bridge Coal Co. recently sank a shaft at High Bridge, both in the north part of the county. With the entrance of these operators into the field Dallas again assumed an important position. In 1907 her production rose from 5,500 tons of the previous year to 70,000 tons and in 1908 this was raised to 174,600 tons. New territory is being constantly prospected and new deposits revealed and it seems safe to prophesy a splendid future for Dallas county's coal industry.

Guthrie County. Coal was early mined over the entire eastern part of this county to supply the local demand. As early as 1867 there were banks opened in the bluffs of the Middle Racoon from its entrance into the county to Fanslers and Panora in

the eastern part. The Marshall coal was opened up in the southeast part of the county along South Raccoon, on Deer creek, on Beaver creek and on Long branch. The Marshall mines on Long branch and the Lonsdale mine on Deer creek were among the most important then in operation and gave their names to the horizons mined. The Marshall coal was of excellent quality, free from impurities and bright and brittle. The Lonsdale was also a good domestic coal and proved a boon to the dwellers of the prairies.

In 1885 there were twenty-three mines operating along the Middle and South Raccoon rivers and their tributaries in the eastern part of the county. All were purely local. Among the most important was the Clipper mine owned by Marchant and Winters and located near Fanslers. It was 126 feet deep and pierced a two-foot vein which was worked longwall. A feature unusual among the small mines was the use of storage sheds, which equalized the demand on the miners and insured a supply adequate to the demand. Several of the mines near Fanslers were from sixty to eighty feet deep. Those farther to the east were generally shallow shafts or drifts. A mine which supplied an important trade at Panora was that of D. D. Rees, 100 feet deep, working an eighteen-inch vein. About 1891 W. D. Simon opened the Greenbriar mine near Jamaica. It was sixty-eight feet deep to a coal bed two feet four inches thick, and was the only mine in the county worked room and pillar. Steam hoist was utilized for some time and was the only installation of the kind in the county. At this time coal was selling for \$2.50 to \$3.00 per ton at the mine and the miners received six cents per bushel. The mines have always had a brisk trade in the winter and owing to the lack of storage facilities have often not been able to keep up with the demand as the coal was especially adapted for domestic use.

All the mines above mentioned are still in operation and of late years a number of others have been located near Yale in the same field as the Jamaica mines and near Bayard and Bagley. In consequence of these developments the industry has assumed quite an importance, although the output is not large as compared with some of the other counties and the county has never had a shipping mine.

Story County. Story has never been an important producer of coal and at only a few points, chiefly in the northern part of the county, have serious attempts been made to obtain it. One of the earliest of these was three miles southeast of Collins, near the southwestern part of the county. Here the Collins Fuel Co. in the summer of 1885 sank a shaft 150 feet to a three and one-half foot vein of coal. This was of excellent quality and the demand always exceeded the supply. The mine was last operated in 1896 by Marshall and Crowe of Boone county. Prospecting proved that the bed had a considerable extent to the south and east. Desultory attempts were made to develop the coal resources of the county near McCallsburg in the northern part of the county and near Gilbert, on the western edge of the county on Squaw creek. About 1899 two local mines were worked at the latter locality by the Zenorsville Coal Co. and Hutchinson Brothers. At the former place a three-foot vein was found and operations were carried on in a crude way for several winters.

The most important operations in the county were carried on at Summit, midway between Gilbert and Story City. In 1892 and '93 the North Star Coal and Mining Co. put down a shaft 135 feet deep to a four and one-half foot bed of excellent coal. The mine was equipped with modern top-works, a steam fan was used and the room and pillar plan was pursued in mining the coal. The creep of the underlying fire clay caused considerable trouble and it was not possible to win more than sixty per cent of the coal. A large local trade was supplied and in addition a considerable amount of the output was shipped over the Chicago and North-Western railroad, a spur from which was extended to the mine. Work was carried on here until about 1898. Another mine which was opened at Summit was that of Benson Brothers, the Story County Coal Co. This was opened about 1898 and also had an excellent equipment and shipping facilities over the North-Western. It was abandoned and the plant moved to Boone county in 1901.

Boone County. As in the case of all the counties in which erosion has laid bare the indurated rocks and revealed the beds of coal, the fuel supplies of Boone county were early discovered and soon utilized. As early as 1849, Owen noted that the black-

smiths of the county were obtaining coal from a bed on Honey creek south of Boone. However, it was some years before mining for export was initiated. After the advent of the Chicago and North-Western Railroad in 1866 mining operations were pursued with vigor and Boone now ranks among the leaders in its coal output.

The first shipping mine was a slope opened in 1867 by T. N. Canfield and C. S. Taylor just west of Boonesboro. A few years later they sank a shaft 242 feet deep. Coal was hauled to the railroad, three miles, for several years. In 1874 the company was reorganized and built a spur to the main line of the North-Western at Boone. Eventually the property was purchased and operated by the Railroad Co. The mine was in active operation for nearly thirty years. In the same year that this mine was opened the Moingona Coal Co. opened a mine at Moingona with Wm. Blythe as superintendent. Six mines were operated by this company and for some years their output amounted to 800 or 900 tons per day. After the North-Western Railroad was completed to Council Bluffs the company shipped most of its product there and sold it to the Union Pacific, but when the mines at Carbon, Wyoming, were opened the Moingona company was obliged to seek new markets. For a number of years Moingona was one of the largest camps in the state and was the scene of great mining activity, but for ten years very little work has been done there.

In 1874 the Northwestern Coal and Mining Co. was organized, with Hon. J. F. Duncombe of Fort Dodge as president and Gen. G. M. Dodge as one of the shareholders. This company did an important shipping business from its mine west of Moingona for a number of years. The field has been recently exhausted.

One of the earliest mines in the county was opened about forty years ago at Hahntown by the W. D. Johnson Coal Co. This was a slope near the river bed but some time after a shaft was sunk from the top of the hill to the same vein, the "lower" vein. The company has been operating continuously to the present time. In the early days of mining the upper vein was considered too poor in quality to be worth mining and operators all looked for the lower one. It is about 230 or 240 feet below the upland

and averages four feet in thickness. At about the same time Arnold and Shepard sank a shaft to the same vein at Shepardtown and worked here for ten years. D. C. Wilbur was also one of the pioneer operators and worked several shallow shafts on the river bottoms two and one-half miles east of Boonesboro thirty years or more ago. He teamed his coal to the top of the hill and sold it locally or to the Boone trade. Another of the early operators was the firm of Birmingham and Keating, who worked the lower vein at Incline across the river from the Wilbur mines. The firm is still operating near Boone under the name of the Birmingham Coal Co.

A few years before these mines opened, about 1875 or earlier, Messrs. George Rogers and William Crowe began operations in a small way. Several shallow shafts were sunk along the river and the firm has since become one of the leading operators of the county. Mr. Crowe has retired within recent years but Mr. Rogers has continued at work. Recently the mine being operated was flooded with water and closed. Twenty-five years ago Samuel McBirnie began operating in the upper vein in Mormon Hollow near Boonesboro. Later he sank mines in the lower vein at Incline. He is out of the coal business at present and is a justice of the peace. One of the largest operators in the county was the Clyde Coal Co., which sank its first shaft at Incline, west of Moingona, in 1885. At first water caused a great deal of trouble but this was overcome and operations were conducted on a large scale. Both veins were worked. Mining machines of the Ingersoll punching type were installed and an incline was built across the river from the flats. Up this incline railroad cars were pulled from the mine to the railway by a large engine and cable. The Clyde Coal Co. was the only operator in the district to install mining machines. They have not proved very successful as the mines tend to squeeze and there is not enough room to operate them. Then, too, the roof is not strong enough for their use. Operations were carried on for about fifteen years, by which time the field was exhausted. The manager of the company was Hamilton Brown, who has since gone into railroad promotion enterprises, including the Newton and North-

western and several roads near Chicago. The superintendent was O. M. Carpenter, who was later interested in the Carpenter Coal Co. and the Scandia Coal Co., of Dallas county, now owned by the Saylor Coal Co. of Des Moines.

Seventeen years ago the Zimbelman Coal Co., composed of George, Lafayette and Alfred Zimbelman, was organized and sank a shaft 220 feet deep to the upper vein. This mine is still in operation and has modern equipment. As many as 100 men have been employed here. The year before this mine was opened Heaps Brothers, James and Andrew, began work and at that time their mine was the farthest on the prairie of any of the mines in the region. The firm has been operating ever since, although both the brothers are dead. James Crowe went into the firm five years ago but was killed at the mine.

Two years ago John and Samuel Smiley and George Heaps opened a mine near Boone. Mr. Heaps has since left the firm and together with Robert Kennedy, former superintendent of the Frazer mines, and P. and W. Benson, has organized the Boone Block Coal Co., which is engaged in sinking a shaft on north Marion street, just inside the corporation limits of Boone. The shaft is to be 243 feet deep to the upper vein, which is here about three feet thick. It is the farthest on the prairie of any of the mines of this district. It has always been supposed that the upper vein thinned out under the prairie and that the sand and drift went down nearly to the lower vein. But nine holes drilled in the vicinity of the shaft showed a good vein of coal. The hole nearest which the shaft is being sunk showed:

	FEET.	TOTAL.
Drift	140	140
Soapstone	30	170
Shale	10	180
Sandstone	9	189
Hard rock with flinty streaks.....	1	190
Shale, white, solid, hard, sandy.....	40	230
Slate, black	10	240
Coal	3	243

In the Boone district the upper vein is always worked long-wall while the lower bed is mined on the room and pillar plan.

Another district which was one of importance was that of Squaw creek valley, which has already been discussed in connection with Story county. In the vicinity of Zenorsville several mines were sunk and a good deal of coal furnished for the local trade as far back as 1870. This coal was considered to be the best in the state. It was very pure, and rather soft. The principal mine was that of Hutchinson Brothers. James and John Hutchinson operated a slope mine on the room and pillar plan and in the winter employed over forty men, although the mine was almost idle in summer. John Clemmons operated a slope and a shaft near the Hutchinson.

Thirty years ago Angus was one of the most important coal camps in the state. A number of large mines were located near here, in Boone, Greene and Dallas counties, although the leading ones were in Boone. The Rock Island Railroad built in from the south and J. J. Hill bought land and put in a railroad, the Fort Dodge-Angus line of the Minneapolis and St. Louis, to take out coal. At that time 2,000 miners were employed and Angus had a population of 3,000. But after a few years the miners struck for more wages, others were brought in, violence ensued and after nine months of this difficulty Hill sold his land, took up his switches, several miles in length, and the town became dead. At present there are only about 300 inhabitants and little remains to indicate the former prosperity except the numerous dumps and switch grades, which are still in evidence over the prairie.

About the earliest miners here were the Climax Coal Company who came in 1878 and operated three shafts. These were well equipped, were ventilated by exhaust fan and used steam power for hoisting the coal. Mine No. 1 had a capacity of 300 tons daily. Another mine which operated on the Boone county side was that of the Eagle Coal Co., owned by the Chicago, Milwaukee and Saint Paul Railroad, which began in 1883 and had connections with the Milwaukee and the Des Moines and Fort Dodge, now the Minneapolis and Saint Louis, railroads. A blower was used for ventilating the mine. It was worked out and abandoned about 1887. Since then only small mines have operated.

The recent developments in the Madrid district are affecting Boone as well as Dallas county and extensive operations may be looked for there in the near future. The same may be said of the Ogden field, where the finding of an excellent bed of coal three to five feet thick at a depth of 270 feet is already stimulating prospecting. Deeper coals are being located than were known before and western Boone and eastern Greene as well as northern Dallas counties may be expected to reap the benefits within a short time.

Another important district is at Frazer, where the Boone Coal and Mining Co. have operated a total of six mines since 1895. These have been well equipped and have had a large output.

Greene County. The principal mines of Greene county centered around Angus although one of some importance was located at Rippey and a smaller one at Grand Junction. The leading operator at Angus was the Keystone Coal Co., which opened three mines, the first in 1878. This one was worked for ten years. Mine No. 2 was worked for some time until an inflow of water stopped operations. Number 3 was opened in 1887 and was 100 feet deep to a vein of coal four to five feet thick. From this level a slope was driven up to a higher bed a few feet above. The mine was splendidly equipped, employed fan ventilation and used three Legg machines, also a drilling machine supplied with power by a 100-horsepower air compressor. It was worked out in 1889. The Standard mine was also a large producer for five years but was closed in 1887. John McKay was superintendent at both mines.

Several smaller mines have been operated in the vicinity for thirty years. The district had a sudden rise to prominence, enjoyed a phenomenal growth and then seemed to decline as rapidly and as completely as it developed.

Hardin County. The early settlers of northern Iowa were not slow to realize the usefulness of such bodies of coal as they discovered in the bluffs and stream valleys and hence it is not surprising to know that in Hardin coal was being used by the turning of the last century to its latter half. Abram Grimsley, the first blacksmith in Hardin county, is credited with obtaining his supply of coal from the bed of the Iowa river near Eldora as

early as 1851. Prior to 1854 S. B. Moran had been prospecting and mining on a small scale near Eldora and soon after that date James Buckner and Edwin Fuller began mining here. As soon as knowledge of the mines spread people came by team from Cedar Rapids, Independence, Waverly and elsewhere, distances of 100 or 125 miles, to obtain coal, as there were no railroads in that part of the state at the time. All of these early mines were drifts and were not commonly kept open more than one season to obtain a winter's supply. During the summer they would cave in and other openings would be made elsewhere.

Near Steamboat Rock coal was mined in 1857 from a drift in a vein four feet six inches thick. The entries were carried in 780 feet. One miner would pick and wheel to the drift mouth eighty-five to 125 bushels per day, for which he was paid four cents per bushel. The coal was used for fuel and for blacksmithing. Prospecting at that time was carried on by means of a spring pole and a two and one-half inch drill, operated by two men.

When White visited this region in 1867 he found that considerable mining had been done to supply the local demand and that, for the three years preceding, the Eldora Coal Co. had been shipping coal over the Central railroad of Iowa and the Dubuque and Sioux City railroad. The bed being mined was four feet thick.

Most of the openings in the county have been near the line between Clay and Eldora townships. These have been called collectively the Chaffin mines and were wrought out about 1880, although a little work was carried on desultorily for ten years longer. During the period of most vigorous exploitation the Chaffin mine proper produced annually over 4,000 tons. In the late 80's the principal mine was that of Bennett and Blair near Eldora, where fifteen miners found employment during the winter. Fourteen hundred tons of coal were produced per year. Since 1890 only one or two small mines have been opened for local use.

Webster County. Coal was known in Webster previous to 1860 as it had been discovered prior to that time by Mr. Gleason and other early settlers. Mining was initiated in the late sixties

and the first shipping mine was opened in 1870 by a company of which J. L. Platt was president and in which Hon. J. F. Duncombe was interested. This mine was located on Holaday creek, several miles below Fort Dodge, and about three miles from the Illinois Central, then the Dubuque and Sioux City railroad, which had been built through only a short time previously. The company built a tramway to the railroad and the cars were drawn by mules. Later the track was widened and steam power was substituted for the mules. In the latter part of the same year, Duncombe and Richards sank the first shaft at the locality which has since been known as Coalville. Two miles of railroad were built to connect with the Illinois Central and coal was hauled out by the company's private engine. Large shipments of coal were made from these two mines and after operating them for a few years the company sold them to the Fort Dodge Coal Company. This firm prospected most of the lands in and around Coalville and mined there for seventeen years. Seven large mines were worked and a large output was maintained. As early as 1880 machines were being used by this company and were giving good satisfaction. Fans were at the same time used in some of the shaft mines to afford ventilation.

About the same time that the Fort Dodge Coal Co. began operations the Craig Coal Co. opened a number of mines at Kalo, opposite the river from Coalville. All of these early mines were drifts and relied on natural ventilation. In 1880 the Minneapolis and Saint Louis railroad was built down the river and gave the mines an outlet to the north. By 1883 these two companies were operating six mines and were putting out 600 tons daily. The Fort Dodge Coal Co. was employing 350 miners who dug thirty cars of coal each day. Other early producers were Collins Brothers, who operated a large shipping mine for ten years, and the Standard Coal Co., whose mines were for a time the largest producers at Kalo. Steam power was used for hoisting. At first the Collins mine was operated to supply the local trade, but in 1886, when the Mason City and Fort Dodge railroad, now a part of the Chicago Great Western system, was built near their mine, steam power was installed and a large tonnage was marketed. As many as 100 men were employed.

In 1895 the Pleasant Valley Coal Co. sank a shaft 105 feet at Coalville and furnished it with the best equipment possible. One hundred men were employed and large quantities of coal were shipped from a six-foot bed of coal. The vein was mined out several years ago.

The next important producer to locate in this district was the Gleason Coal Co., which sank its first shaft in 1899. Two hundred thousand tons were taken from this mine before it was abandoned in 1907. A well equipped power house was built and steam hoist was used. In 1908 the company began sinking mine No. 2, the only mine now operating in the Coalville district, a district which has been a consistent and heavy producer of coal during a period of nearly forty years. This new mine is located only about 600 feet from the first Duncombe mine and it gives promise of being a much better producer as the coal is better and thicker than in the old mine.

A great deal of coal has been taken from the Lehigh district, about seven miles southeast of Coalville. The first operator of importance in this field was Hon. W. C. Wilson of Webster City, who in 1871 opened a mine here and subsequently formed the Crooked Creek Coal and Railroad Co. This company built and still operates its own line of railroad over which its coal is hauled. Originally this was run from Judd on the Illinois Central to the mines, but now it extends to Webster City. The first mine was a slope, worked longwall and ventilated by furnace. About 1885 two slopes and in 1894 two other mines were opened.

In addition to these mines W. C. Beem opened Black Diamond No. 1 about 1880 and No. 2 about 1886. Both were located on Crooked creek near Lehigh and were good producers for quite a number of years. The Messrs. Corey have operated quite a number of mines since 1885 and were working as late as 1903. The Webster County Coal and Land Co. was organized about 1899 and operated a mine near Lehigh until 1902. A large number of local and shipping mines have supplied the market with abundant fuel although within recent years the number has been considerably reduced.

In early days miners were paid ninety cents per ton for screened coal. During the last ten years about seventy cents

has been the ruling figure for run of mine. The price obtained for coal during this period has varied from \$1.25 to \$2.50 per ton, according to the quality of the coal and industrial conditions.

Taylor County. Although the coal beds of southwestern Iowa are very thin their regularity and wide extent are factors which have aided in their exploitation and their distance from other fields has insured them a ready market. So far as known the first mining in the county was on the land of J. R. Foster, about two miles south of Henshaw in the bluffs of the East Nodaway. Mr. Foster had been working here for some years before White visited the region in 1866. Although the bed was only eighteen inches thick it was mined profitably as it was of good quality and was in large demand, especially by the blacksmiths. From this time on there were a number of openings made from time to time in the vicinity and also a few miles farther south, near Hawleyville. In the early 80's, one of the principal operators was Gomer Beynon, whose shaft was a mile south of the Foster bank. He opened his second shaft in 1887. During this period a number of mines were opened and a considerable amount of coal was taken out. At first this was the principal locality in the county but later New Market became more prominent.

The first shaft to be sunk in the latter field was opened by John Lindsay in 1883. Unfortunately Mr. Lindsay found mining unprofitable and he soon met with financial embarrassment. The next year W. Harvey Drennen sank a shaft, but did not operate it long. In the next few years several local mines were put down. These were first worked room and pillar but later operations have all been on the semi-longwall or longwall system.

The first shipping mine was opened in 1885 by Benjamin Anderson east of New Market, on the Humeston and Shenandoah railroad, now part of the Burlington system. This shaft was 130 feet deep and the mine was worked longwall. Twenty miners were employed and for some years this was the largest mine in the county. In 1886 Roderick Campbell came to New Market and leased the Lindsay mine which he operated one year. After working another local shaft for some time he and his sons opened a mine one mile east of New Market in 1897,

beside the railroad right of way. At first this was a local mine but later shipping connections were made and an outside market has been supplied. The mine is still in operation and is one of the largest producers in the county. In 1901 Campbell No. 2 was sunk, but so far has been used only as an air shaft. Within the next three years following the opening of his first mine Mr. Anderson had sunk two others, one of which is still in operation, although No. 1 was abandoned some years ago. About 1898 William Browning opened a shipping mine west of the Campbell. These three are the only shipping mines in the county but several locals have been opened from time to time.

When mining first began in the New Market district seven cents per bushel was paid for mining while twelve and one-half cents was received in the market. A few years later the miner received five cents for his labor and the coal sold for ten cents per bushel. Within the last twelve years four to five and one-half cents has been paid for mining while the operator has received from seven to eleven cents per bushel for his product. The mines of this district range in depth from sixty-five to 150 feet and are all equipped with horse hoist. Although there have been at least twenty shafts sunk in the vicinity of New Market, not over 140 acres have been mined out since operations began. These mines like those of the neighboring counties are and always have been non-union.

Page County. Coal was mined in Page county in the late 50's and early 60's, twenty or twenty-five years before the railroad went through in 1881. The first work was done at Pinhook, southeast of Clarinda, on the Nodaway river, in the neighborhood of the old Shambaugh mill. Coal was hauled from here in wagons to Omaha and Council Bluffs and Nebraska City. Twenty-five cents per bushel was charged at the mine and on the market sixty cents was received. Numerous drifts were opened here and also at other localities south of Clarinda. One of the largest of these was worked by Thomas Proser and was operated by a shaft and two slopes. It was one of the few mines in the Nodaway seam to be worked on the room and pillar plan.

By 1880 there were several mines opened near Shambaugh, five miles south of Clarinda. These were nearly all shafts and

were worked on the longwall plan. In an attempt to discover deeper coal Samuel Pinkerton drilled a hole in the bottom of his shaft, which was 110 feet deep, until he reached a depth of 400 feet but without success. None of these mines supplied more than a local trade and most of them were not worked more than two or three seasons. Wages and selling prices did not vary much from those in force today. Five to six cents per bushel were paid the miners and the operator received nine to ten cents for his coal. Practically nothing has been done at Shambaugh since 1901.

In the early years all the mines near Clarinda were located east of the town. Within the last six years, however, several shafts have been sunk west and southwest of the city and are supplying an important local trade. One of the first of these was that of Johnston and Co., which is still in operation and is the only one which uses steam hoist. The Van Arsdal mine is another which is still open. These mines gave a great impetus to the mining industry of the county and raised its production from 1,850 tons during the fiscal year 1901-1902 to 9,674 tons for the next year.

Within the last three years the Coin Coal Co. has sunk a deep shaft at Coin and has equipped it with steam hoist and jet ventilation. A large local trade keeps the mine employed at its full capacity.

Adams County. Adams has been the most important coal producer of southwestern Iowa if not the pioneer in the industry. Forty-five years or more ago coal was being mined in the banks of the Middle Nodaway by stripping or openings. Carbon has been the center of the industry for many years although during the early 60's the village of Quincy, two miles east of Carbon, was the largest and most important town in the county. Here were situated the offices of the county government and a large business was carried on. But with the advent of the railroad Corning assumed the leading position and later became the county seat. Since then Quincy has declined in importance until today it is practically without economic significance.

Two miles west from Quincy on the banks of the Nodaway the first coal was mined. John Houck was one of the first min-

ers and has operated ever since until recent years. He obtained coal by stripping. When White was in southwestern Iowa in 1866 Messrs. Barnett and Smith were mining coal here and were sinking a shaft in search of deeper beds of coal. Whether they succeeded is not stated, but in view of later developments, it is not at all likely. Other pioneers were Messrs. Wirt, W. Rush and H. Rimby. The first of these worked a bank four miles down the river from Carbon at least forty years ago, and Mr. Rush was one of the first operators to sink a shaft to the coal seam. This was near the outcrop, but since then operations have been carried farther away from the river until now they are all on the east side of Carbon. A little later, about thirty years ago, came Mr. Jones, and he and his son Martin have operated shafts continuously until the present day. The younger Mr. Jones is at present developing a new mine 110 feet deep on the south edge of Carbon. In the late 70's Thomas Gabbie, who had operated the first longwall mine in the Center-ville district, came to Carbon and opened a shaft. He and his brother John worked mines in the neighborhood until the close of the last century. When the Mine Inspector made his first tour of the state in 1880 and '81 there were thirteen mines in the county, all near Carbon with one exception, and 176 men were employed. Among later operators have been J. F. Wild, who has run mines here since 1889, and J. F. Ruth, who has opened four mines in the past thirteen years, and whose father, William Ruth, preceded him as an operator in this field. These two, with Mr. Jones, are the only men at present working mines in the vicinity.

In the neighborhood of Briscoe, in the northwest corner of the county, mines have been worked for thirty-five years. Some of the pioneers in this field were Joseph Briscoe and George Plowman, whose mines were among the largest in the field. Mines have been opened up from time to time although at present but one operator is located here, H. K. Demirjean.

Between Briscoe and Carbon, at Eureka, several mines have been opened in the last fifteen or twenty years. James and William Hartshorn and Henry Hudspeth opened mines in the early 90's and work has been continued there until the present. Mc-

Kee Brothers are now working the Dixon shaft near Eureka. Southwest of Carbon is another center of mining, at Hoyt, where operations have been carried on during the last eight or nine years. Only small mines are opened.

Within the last three years two mines have been opened up near Nodaway and have become the largest producers of the county. The shaft of Daugherty and Son is the only one in the county which has ever had steam hoisting equipment. That of Frederick Weil is as large a mine but has horse hoist.

Several small mines have been opened in southern Cass county near Briscoe by Royal Hudspeth, Andrew Bennett and others. They were operated during the late 70's and the 80's, but nothing has been done here for a good many years.

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Illustration 13
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facing p. 590
(v. 19)



COAL STATISTICS*

BY S. W. BEYER.

Iowa was probably the second state west of the Mississippi river to open a coal mine, Missouri alone preceding her. The United States Census report for 1840 credits Missouri with a production of about 10,000 tons and gives Iowa's output as 400 tons. According to the Mineral Resources for 1907 the production in Iowa since 1840 has been as follows:

PRODUCTION OF COAL IN IOWA 1840-1908

IN SHORT TONS

Years	Tonnage	Years	Tonnage	Years	Tonnage
1840 -----*	400	1863 -----	57,000	1886 -----	4,315,779
1841 -----	500	1864 -----	63,000	1887 -----	4,473,828
1842 -----	750	1865 -----	69,574	1888 -----	4,952,440
1843 -----	1,000	1866 -----	99,320	1889 -----	4,095,358
1844 -----	2,500	1867 -----	150,000	1890 -----	4,021,739
1845 -----	5,000	1868 -----	241,453	1891 -----	3,825,495
1846 -----	6,500	1869 -----	295,105	1892 -----	3,918,491
1847 -----	8,000	1870 -----	263,487	1893 -----	3,972,229
1848 -----	10,000	1871 -----	300,000	1894 -----	3,967,253
1849 -----	12,500	1872 -----	336,000	1895 -----	4,156,074
1850 -----	15,000	1873 -----	392,000	1896 -----	3,954,028
1851 -----	18,000	1874 -----	799,936	1897 -----	4,611,865
1852 -----	20,000	1875 -----	1,231,547	1898 -----	4,618,842
1853 -----	23,000	1876 -----	1,250,000	1899 -----	5,177,479
1854 -----	25,000	1877 -----	1,300,000	1900 -----	5,202,939
1855 -----	28,000	1878 -----	1,350,000	1901 -----	5,617,499
1856 -----	30,000	1879 -----	1,400,000	1902 -----	5,904,766
1857 -----	33,000	1880 -----	1,461,116	1903 -----	6,419,811
1858 -----	37,500	1881 -----	1,960,000	1904 -----	6,519,933
1859 -----	42,000	1882 -----	3,920,000	1905 -----	6,798,609
1860 -----	41,920	1883 -----	4,457,540	1906 -----	7,266,224
1861 -----	50,000	1884 -----	4,370,566	1907 -----	7,574,322
1862 -----	53,000	1885 -----	4,012,575	1908 -----	7,149,517

Data for the years preceding 1883 are very meager. The Federal Census for 1850 reports 359 miners under the head of

*Data obtained largely from the Federal Census reports and the publications of the United States Geological Survey.

trades and professions but gives no other facts relative to the mining industry in Iowa. The Federal Census for 1860 reports sixty-nine mines, capitalized at \$34,900, in operation, employing 174 men and producing 41,920 tons of coal valued at \$92,180. Incidentally it is stated that the value of the output for 1850 was \$4,000 which does not check with the figures given in the table above.

In the census for 1870 the first statistics by counties are to be found. According to this report the leading coal producing counties were:

	TONS.
Polk	45,600
Boone	42,143
Mahaska	32,550
Webster	32,400
Wapello	31,630
Jasper	20,720
Scott	17,325
Monroe	15,410

Lesser amounts were produced by the remainder of the producing counties of today. The total production for the state was 263,487 tons valued at \$874,334. It is interesting and instructive to note that Scott ranked seventh in 1870, producing a larger tonnage than for any year, with the single exception of 1906, since county statistics are available. It is probable that the earliest producing counties are faithfully indicated by the above list. The statistical history of the industry by counties and for the state as a whole is shown in the tables appended herewith. The first table gives the total production by counties from 1883 to 1908 and the second table gives the total tonnage, average price per ton, average number of days worked and the average number of men employed for the state as a whole for the years 1875 to 1908 inclusive.

PRODUCTION OF COAL IN IOWA FROM 1883 TO 1908

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TABLE I—PRODUCTION OF COAL IN IOWA FROM 1883 TO 1908

Counties	1883	1884	1885	1886	1887
Adams	4,358	4,459	4,364	10,731	22,233
Appanoose	144,364	178,064	275,404	168,000	179,593
Boone	523,019	529,842	513,174	330,366	187,116
Dallas	42,793	41,647	36,944	24,624	45,270
Davis	590	1,358	37,694	1,120	2,016
Greene	99,513	107,886	100,337	131,643	118,601
Jasper	51,389	51,896	101,276	320,358	159,033
Jefferson	43,553	9,153	1,250	1,213	11,645
Keokuk	560,045	482,652	417,554	610,741	670,888
Lucas	546,360	460,017	492,750	594,450	529,758
Mahaska	1,038,673	1,044,640	854,319	953,525	1,148,614
Marion	101,903	108,735	112,012	158,697	238,218
Monroe	104,647	110,238	113,699	131,824	205,525
Page	838	1,130	2,037	1,736	1,993
Polk	625,879	694,312	518,442	378,520	341,705
Scott	4,160	4,280	6,650	3,360	9,670
Taylor	105	142	691	9,615	13,642
Van Buren	1,880	1,991	1,336	9,003	29,491
Wapello	266,360	269,607	210,461	265,564	304,722
Warren	14,367	15,374	14,364	26,132	27,772
Wayne	2,119	5,541	28,909	38,080	31,454
Webster	278,387	239,696	162,732	120,710	163,768
Other counties and small mines	-----	-----	-----	-----	-----
Total output	4,457,540	4,370,566	4,012,575	4,315,779	4,473,828

Counties	1888	1889	1890	1891	1892
Adams	21,075	13,457	†	†	†
Appanoose	235,495	285,194	284,560	409,725	411,984
Boone	156,959	174,392	153,229	151,659	139,820
Dallas	54,457	67,055	33,466	48,710	26,550
Davis	2,016	3,825	†	†	†
Greene	122,127	51,438	45,192	53,215	43,360
Jasper	308,200	199,152	173,044	267,202	163,860
Jefferson	10,514	8,123	*351,600	*800	*1,000
Keokuk	607,002	455,162	349,318	316,303	361,233
Lucas	408,765	339,229	*351,600	*800	*1,000
Mahaska	936,299	1,056,477	1,103,831	1,231,405	1,141,131
Marion	258,330	145,180	153,506	165,867	134,400
Monroe	261,962	258,401	324,031	393,227	507,106
Page	3,842	2,768	†	†	†
Polk	336,749	434,047	367,852	309,467	388,590
Scott	10,170	9,446	†	†	†
Taylor	8,962	9,736	†	10,500	15,204
Van Buren	29,075	39,258	47,464	36,166	28,946
Wapello	426,042	359,199	341,932	165,827	231,472
Warren	19,155	14,515	8,470	2,000	3,600
Wayne	27,208	17,480	25,415	45,000	62,078
Webster	178,881	137,739	118,829	78,022	115,154
Other counties and small mines	-----	-----	140,000	140,000	140,000
Total output	4,952,440	4,095,358	4,021,739	3,825,495	3,918,491

*Combined output.

†Included in small mines.

COAL STATISTICS

TABLE I—CONTINUED

Counties	1893	1894	1895	1896	1897
Adams	†	†			
Appanoose	489,920	667,271	588,438	544,768	670,143
Boone	172,070	241,522	268,422	316,756	292,218
Dallas	13,461	10,201	6,061	*9,624	6,853
Davis	†	†			
Greene	18,000	5,220	7,197	*9,624	9,245
Jasper	162,639	121,804	155,707	164,110	175,316
Jefferson	*482	*1,127			
Keokuk	152,097	142,750	266,394	214,474	289,478
Lucas	*482	*1,127			
Mahaska	1,419,930	1,152,988	1,016,623	1,047,241	1,420,510
Marion	111,145	108,695	193,768	93,023	129,502
Monroe	393,227	507,106	559,982	433,520	497,831
Page	†	†			
Polk	271,731	395,647	485,360	546,051	489,136
Scott	†	†			
Taylor	10,990	14,780	14,062	8,400	10,726
Van Buren	22,867	23,619	9,896	8,396	5,760
Wapello	230,460	278,583	261,510	227,077	229,470
Warren	3,000	12,649	6,116	12,824	6,610
Wayne	65,436	42,224	46,315	42,732	56,996
Webster	117,096	103,009	123,882	134,704	168,899
Other counties and small mines			146,391	150,418	153,172
Total	3,972,229	3,967,253	4,156,074	3,954,028	4,611,865

Counties	1898	1899	1900	1901	1902
Adams					19,751
Appanoose	608,165	636,421	680,094	721,997	900,337
Boone	331,543	290,525	266,542	254,054	254,324
Dallas	7,907	10,804	16,777	16,987	18,845
Davis					3,953
Greene	12,920	17,568	17,044	18,810	11,573
Jasper	143,945	191,928	99,948	184,670	233,440
Jefferson					10,610
Keokuk	251,145	314,900	258,933	308,193	106,103
Lucas	6,600	32,419	227,921	221,058	246,400
Mahaska	1,292,787	1,273,473	1,142,017	929,110	723,567
Marion	127,293	231,668	186,446	145,981	315,425
Monroe	584,578	689,004	755,286	1,038,332	1,406,905
Page					10,070
Polk	635,606	749,708	827,482	1,025,014	1,023,860
Scott					10,358
Taylor	6,555	10,965	17,159	23,499	14,207
Van Buren	6,600	9,385	12,108	12,572	14,816
Wapello	249,624	325,029	276,360	312,174	340,762
Warren	7,120	34,815	24,724	14,661	20,127
Wayne	51,550	62,818	65,140	56,578	65,374
Webster	137,548	124,841	123,660	146,020	149,615
Other counties and small mines	157,366	171,208	205,338	187,789	4,344
Total	4,618,842	5,177,479	5,202,939	5,617,499	5,904,766

*Combined output.

†Included in small mines.

TABLE I—CONTINUED

Counties	1903	1904	1905	1906	1907	1908
Adams	22,570	12,970	13,071	11,724	14,343	17,492
Appanoose	893,021	872,920	884,248	1,101,595	1,123,409	1,159,181
Boone	291,321	285,157	292,659	233,110	208,150	237,498
Dallas	15,467	13,086	5,000	5,522	70,042	174,585
Davis	3,160				1,300	3,700
Greene	14,971	27,704	20,058	19,816	16,289	12,931
Jasper	270,804	258,098	306,164	388,582	397,297	393,516
Jefferson	6,844	9,810	3,379	3,744	4,000	†
Keokuk	62,875	41,512	16,460	17,144	27,716	18,301
Lucas	295,554	189,895	147,093	97,147	105,536	†
Mahaska	698,166	675,113	714,945	602,487	757,778	809,233
Marion	324,859	314,908	338,812	372,750	346,999	294,587
Monroe	1,768,054	1,987,450	2,225,677	2,458,473	2,476,021	1,965,619
Page	16,343	18,302	14,013	11,235	14,338	11,364
Polk	1,032,164	1,130,668	1,210,320	1,369,506	1,460,203	1,618,895
Scott	12,653	9,930	6,222	24,778	1,047	
Taylor	16,933	16,273	22,345	19,052	19,692	15,833
Van Buren.....	13,561	8,005	6,192	12,137	15,374	12,862
Wapello	382,398	379,560	303,360	243,256	258,651	184,652
Warren	12,760	11,290	9,876	2,850	5,054	6,720
Wayne	105,170	98,879	112,549	136,694	146,901	126,159
Webster	138,296	134,538	113,393	109,522	80,275	63,218
Other counties and small mines	21,867	23,865	32,773	25,100	23,907	23,171
Total	6,419,811	6,519,933	6,798,609	7,266,224	7,574,322	7,149,517

TABLE II

Years	Short Tons	Average price per ton	Average No. of days worked	Average No. men employed
1875	1,231,547	\$ 2.03		
1880	1,461,166	1.72		
1882	3,920,000			
1883	4,457,540			
1884	4,370,566			
1885	4,012,575			
1886	4,315,779	1.25		
1887	4,473,828	1.34		
1888	4,952,440	1.30		
1889	4,095,358	1.33		9,247
1890	4,021,739	1.24	213	8,130
1891	3,812,495	1.27	224	8,124
1892	3,918,491	1.32	236	8,170
1893	3,972,229	1.30	204	8,863
1894	3,967,253	1.26	170	9,995
1895	4,156,074	1.20	189	10,066
1896	3,954,028	1.17	178	9,672
1897	4,611,865	1.13	201	10,703
1898	4,618,842	1.14	219	10,262
1899	5,177,479	1.24	229	10,971
1900	5,202,939	1.38	228	11,608
1901	5,617,499	1.39	218	12,653
1902	5,904,766	1.47	227	12,434
1903	6,419,811	1.65	226	14,162
1904	6,519,933	1.61	213	15,629
1905	6,798,609	1.56	209	15,113
1906	7,266,224	1.60	224	15,260
1907	7,574,322	1.62	230	15,585
1908	7,149,517	1.65	205	16,439

In 1908 Iowa ranked ninth in total production and eighth in value of output. She ranked second in both production and value of output of the states west of the Mississippi river. Missouri was apparently the first state west of the Mississippi river to produce coal on a commercial scale and held first place from 1840 to 1873. In 1874 Iowa took the lead and retained it until passed by Colorado in 1900. The ten leading producers of bituminous coal for 1908 are as follows:

TEN LEADING PRODUCING STATES IN 1908

State	Short Tons	Percent- age of total	Value	Percent- age of total
1. Pennsylvania	117,179,527	28.2	\$118,816,303	22.3
2. Illinois	47,659,690	11.5	49,978,247	9.4
3. West Virginia.....	41,897,843	10.1	40,009,054	7.5
4. Ohio	26,270,639	6.3	27,897,704	5.2
5. Indiana.....	12,314,890	3.0	13,084,297	2.5
6. Alabama.....	11,604,593	2.8	14,647,891	2.8
7. Kentucky.....	10,246,553	2.5	10,317,162	1.9
8. Colorado.....	9,634,973	2.3	13,586,988	2.6
9. Iowa	7,161,310	1.7	11,706,402	2.2
10. Kansas	6,245,508	1.5	9,292,222	1.7
Whole United States.....	415,842,698	100.0	\$532,314,117	100.0



Figure 104. Diagram showing value of coal production from 1897 to 1908.