

*The
Kentucky Geological
Survey*

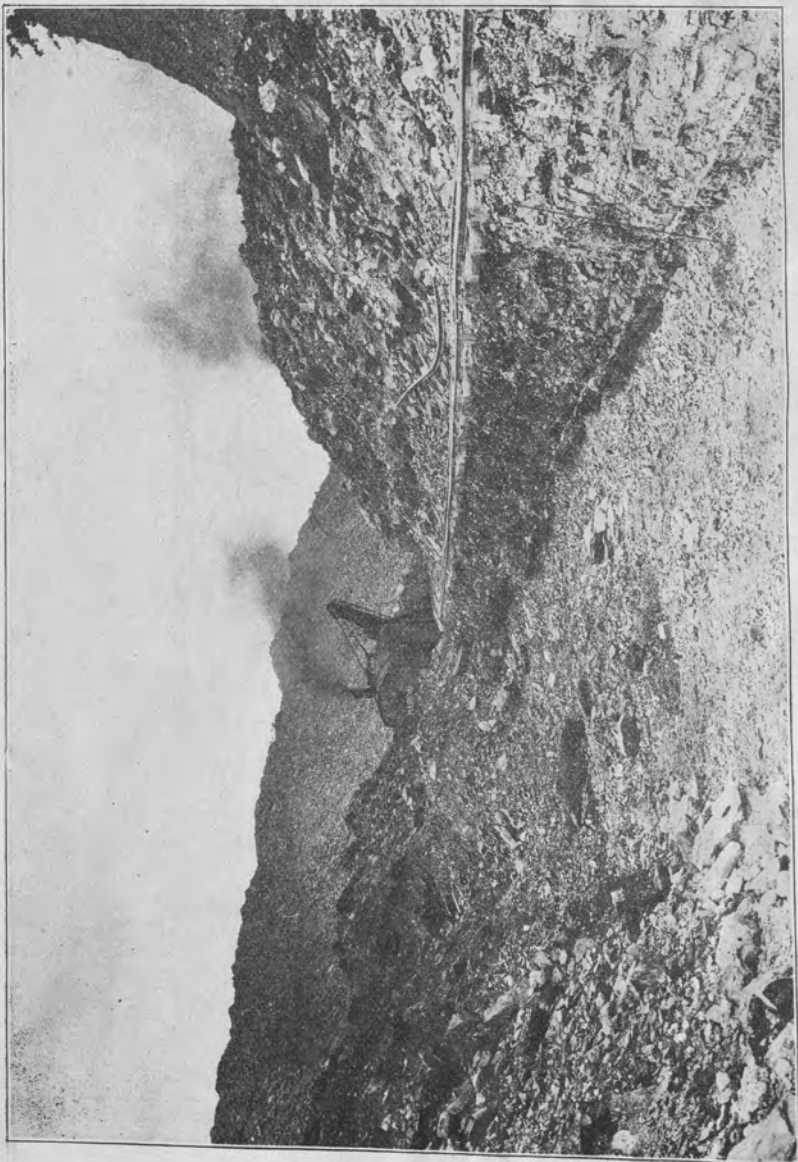
WILLARD ROUSE JILLSON
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SERIES SIX
VOLUME TWENTY

*Coal Industry
in Kentucky*

1924



THE SUNLIGHT COAL MINE

This gigantic stripping operation, located near Madisonville, Kentucky, is typical of the best operations of its kind in the Western coal field. The No. 11 coal, 6 feet in thickness, is being uncovered by steam shovel methods. Operations of this kind account for a large fraction of the volume increase of Kentucky produced coal in recent years.

THE COAL INDUSTRY IN KENTUCKY

A Review of the Discovery, Development, Mining Methods, Qualities, Markets, Analyses, Geology, Correlations, Locations, Production Statistics, and Mine Operators of the Coals of Kentucky, Including a Complete Bibliography.



BY

WILLARD ROUSE JILLSON

DIRECTOR AND STATE GEOLOGIST

*Illustrated with Forty-two Photographs,
Maps and Diagrams*

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THE KENTUCKY GEOLOGICAL SURVEY
FRANKFORT, KY.
1924

Preface

The individual coals produced in Kentucky are now widely recognized to be admirably adapted for steam making, gas production, by-product purposes, and domestic consumption. This coupled with their geographic position, close to the center of population of the United States, has served to make them of very general interest. Computed in tons or evaluated in dollars at recent prices, the coals of this State assume first importance as a mineral resource. Among our natural resources they are only surpassed by the value of soils of the entire Commonwealth.

Within recent years the growth of the coal mining industry in Kentucky has been stupendous. At the present, including a very large number of wagon mines which are temporarily inactive, the total number of operations approaches 1,000. Exclusive of the wagon mines the number of bona fide operations is something over 750. The number of men employed totals many many thousands, and the annual value of the product has within recent years ranged between \$100,000,000 and \$150,000,000.00. Sponsored by such large labor and capital investments, the demand upon the Kentucky Geological Survey for information concerning the coals of the State has increased very greatly during the last few years. This report has been designed and is issued to meet many of the inquiries concerning this great mineral resource. The author's earlier report, briefly outlining the course of this industry and published in 1922, has been revised, re-written and coupled with much new information based on original field investigations to form the present volume.

W. R. Gillson

Director and State Geologist,
Kentucky Geological Survey

Old State Capitol,
Frankfort, Ky.
December 1, 1923.

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Contents

	Page
Preface	v
Contents	vi
Illustrations	vii
Chapter I. Discovery and Early Use.....	1
Chapter II. A New Kentucky Industry.....	15
Chapter III. The Coal Industry Reborn.....	27
Chapter IV. Coal Mining Methods.....	43
Chapter V. Qualities and Use.....	57
Chapter VI. Analyses of Mine Samples.....	67
Chapter VII. Geology and Production of Coal.....	91
Chapter VIII. The Eastern Coal Field.....	109
Chapter IX. The Western Coal Field.....	127
Chapter X. Bibliography of Kentucky Coals.....	137
Appendix A	155
Appendix B	157
Appendix C	158
Index	160

Illustrations

	Page
No. 1. The Sunlight Coal Mine.....	Frontispiece
No. 2. Barbourville, Kentucky	4
No. 3. The "Breaks of Sandy".....	7
No. 4. The Elkhorn Coal Field.....	11
No. 5. A Virgin Coal Field.....	13
No. 6. Coal Measure Topography Near Williamsburg.....	17
No. 7. Detail of the Hazard Coal.....	19
No. 8. Modern Mine Equipment on Clover Fork.....	21
No. 9. The Pride of Eastern Kentucky.....	23
No. 10. The Cumberland Mountains.....	24
No. 11. Face of No. 9 Coal, Arnold Mine.....	28
No. 12. A Splendid Eastern Kentucky Coal Town.....	30
No. 13. The Hardy-Burlingham Mining Co.....	32
No. 14. An Eastern Kentucky Coal Field Gateway.....	34
No. 15. Middlesboro—A City Built by Coal.....	39
No. 16. Hopkins County Coal Awaiting Shipment.....	41
No. 17. A Unit Coal Mine and Town.....	44
No. 18. Blue Grass Coal Co. Camp.....	46
No. 19. A Coal Camp School.....	48
No. 20. Cutting Machine, Shamrock Mine.....	50
No. 21. An Eastern Kentucky Bucket Line Tipple.....	53
No. 22. An Ilsley Stripping Shovel.....	55
No. 23. The Elkhorn Coal.....	59
No. 24. A Six Foot Face of No. 11 Coal.....	61
No. 25. Face of Hazard (No. 6) Coal.....	63
No. 26. A Special Entry.....	65
No. 27. Mining Coal with a Steam Shovel.....	68
No. 28. Horst in Pine Mountain Fault.....	79
No. 29. Sketch Map of Coal Fields in Kentucky.....	92
No. 30. A Stripped Out Area.....	94
No. 31. A Coal Mine in the Hazard Field.....	96
No. 32. The Flag (No. 7) Coal.....	98
No. 33. A Car of Blue Gem Coal.....	101
No. 34. Loaded Mine Cars.....	106
No. 35. A Big Sandy Coal Mine.....	109
No. 36. A Hazard Field Opening.....	110
No. 37. The Kentucky Solvay Company.....	115
No. 38. American Rolling Mill Co.....	122
No. 39. The Pride of Western Kentucky.....	127
No. 40. St. Bernard Power Plant.....	129
No. 41. A Hopkins County Mine.....	131
No. 42. Providence, Kentucky	135

THE COAL INDUSTRY
IN KENTUCKY

CHAPTER I.

DISCOVERY AND EARLY USE.*

The story of the discovery and first use of coal in Kentucky for heating and cooking purposes will forever remain shrouded in the obscurity of the ages. While to the copper-hued American aborigine must certainly be given the credit for first seeing and using this great present day mineral resource, at what time or where within the confines of this state this marvelous accident occurred no one will ever know. Doubtless in the dim past and long before his race had experienced the intelligence of the "Mound Builders," while on a hunting or warring expedition, he found as he crossed some stream or sandy bar, or shore, light, black fragments of the mineral substance which we call coal. To his primitive mind, these little pebbles at first meant nothing. Perhaps they were picked up, and carried for a time, only to soon be dropped with a growing fatigue or changing fancy. At another time and in another mood he carried fragments of Kentucky cannel coal back to camp and at leisure carved out little queer-shaped ornaments and beads, as a number of celebrated collections from this state show.¹ Yet strange as it may seem, neither his history nor the material effects which he left indicate that the Appalachian Indian knew or made use of the coals of this region for either cooking or heating.

With all the known evidence against the premise, it still seems odd that the Indians of the Eastern United States who were forever picking up stones and putting them into their fires for cooking purposes should not have at some time, and probably remotely, thrown in a lump or two of coal. It is a well known fact that some of the tribes of the south-western United States used coal in firing their pottery, and the records of some of the earliest adventurers in the State of Kentucky show plainly that coal occurred in abundance openly distributed over the ground at a number of points on the Warriors' Trail from Cumberland Gap north-eastward to the mouth of the Little Scioto river. With these facts in mind, it seems impossible to believe that the "Red

*Read before the Filson Club in Louisville, Ky., Monday, Nov. 7, 1921.
¹ Prehistoric Men of Ky. Young. Filson Club, 1919, pp. 248, 252.

Man," lazy, yet shrewd as he was, would not have known that this mineral substance would burn, giving much more durable and satisfactory fire than wood. While we know that the Indian and his ancestor, the Mound Builder, did not frequent the interior of the eastern coal field except on a very occasional hunting party, he was continually crossing and camping within the western coal field, as his relics prove.² In this part of western Kentucky there never has been a time when fragments of coal could not be plainly seen in many places and picked up with little effort in hundreds of branches along the river banks. There never has been a time when coal has not been exposed either by precipitous meander of streams or through slide or fault in the hillsides of the eastern Kentucky coal field, the Indians' great game preserve. With these facts in mind, though Anthropologists are agreed that the American Indian did not commonly use coal for burning purposes, it seems only reasonable to assume that he knew of its highly combustible nature and had used it when convenient countless thousands of times before the Caucasian ever set foot on the soil of the new world.

THE COAL FORMING PERIOD.

Difficult and uncertain are those paths which lead back to the actual discovery of coal in Kentucky; the interested investigator who would measure in terms of years the period which has elapsed since first these coals were deposited by the inspired hand of Mother Nature, will find he has yet before him problems by the side of which his earlier quest becomes as child's play. The man does not live who can say with authority or any degree of accuracy the number of years which have passed during the long train of ages since the first coals were deposited in this state. These were laid down in the most recent part of what geologists recognize nowadays as the Mississippian epoch, one of the latter periods of the ancient Paleozoic. Where now known, chiefly in western Kentucky, these sub-carboniferous coals are very thin lenses widely separated horizontally and vertically in the geological sections. Sometimes their thickness attains only a fraction of an inch, while the extent of the seam likewise may fre-

² Prehistoric Men of Ky. Shaler. Ky. Geol. Surv., Series II, 1876, p. 30.

quently be measured in inches or in feet. But coals they are in every respect, and may be recognized as the tell-tale straws presaging the coming of the world's greatest coal making epoch, the Pennsylvanian period.

So it is that in this state as elsewhere in the Appalachian region the Coal Measures are known as an almost numberless sequence of coals, thick and thin, intercalated within an alternating system of generally thick sandstones, thicker shales, and very thin and somewhat rare limestones. In the lower group of Pennsylvanian formations known in ascending order as the Pottsville, Allegheny and Conemaugh, occur nearly all of the coals we know in this state today. These range in thickness from less than an inch to as much as six and eight feet in the solid. Where is the man who can ride through the creeks of eastern Kentucky or the flat rolling bottom lands of the western coal fields and seeing these great storehouses of pent-up solar energy refrain from wondering for the thousandth time where it all came from, and what the exact processes were in its formation?

He who would see the recreation of this ancient workshop of Mother Nature must forget for the moment the topographic appearance of Kentucky today. He must travel backwards, as it were, through flight of fancy, to a time countless thousands of years ago in the late Mississippian period, when as a result of broad crustal uplifts far reaching in their effects, that relatively small portion of the American continent which is known today as Kentucky was gently and quite imperceptibly raised from moderate ocean depths to elevations ever so slightly above sea level. Conceive, if you will, that when the uplift had reached this important point, vegetation growing along adjacent shores spread its network of interlacing fibre over the new land surface. Great forests composed for the most part of fern-like trees, which were the predecessors of those we know today, spread out and shortly covered in mattress form of tangled root, twig and trunk, the new made land.

The crustal forces, however, which gave rise to this broad uplift were not sustained, and there set in almost immediately a period during which the entire area now embraced within the confines of Kentucky, as well as parts of most of the adjoining states, were slowly depressed. This depression occurred, how-

ever, in such a way that there were periods of relatively rapid movement alternating with periods of more or less stability.



BARBOURVILLE, KENTUCKY

This town is located on the upper Cumberland River in the heart of the Blue Gem coal field. It is the seat of Knox County.

During the periods of relative stability, vegetation flung its mantle out over the new made land. During the periods of depression, the great forest mattresses, representing the vegetal accumulations not infrequently of many centuries, were submerged and completely covered by newly washed in and deposited elastic sediments which were to be the sandstones and shales of today. Occasionally some little basin-like area remained far enough from the shore or stream debouchure to preserve a fairly clear water in which came to live migratory forms of marine and semi-marine animal life. This sea life in raining down and abandoning at death countless shells and tests, gave rise to thin and impure limestones. The oscillatory cycle of basin filling, swamp forests and subsequent slight submergence was many, many times repeated. Today each separate and individual coal seam, be it thin or thick, is a certain and enduring monument to those relatively rapid though small crustal changes of the earth in that far-off Paleozoic time.

Through the still lapse of the ages which followed this great coal making epoch, the Pennsylvanian coal measures became slowly consolidated or hardened through regional heat and pressure, the principles of coal formation being undoubtedly quite as active today as they ever were. During all this time no man saw these processes take place. But the record of the animal life of the coal making period is plain. Innumerable fossils show that it was an age in which invertebrate shell fish, bivalves and clam-like animals predominated in numbers. But higher types of life were also present in large numbers. These were the low vertebrates, the primitive and ancient fishes. Here and there in numbers yet much in the minority were the early amphibians of small figure tracking their way across the slimes and muds of old shore lines and beaches. Air-breathing reptiles, though present, had not yet made their appearance in abundance, and as for the higher warm blooded mammals, their time was yet to come by thousands of thousands of years.

But Mother Nature was about her work much the same as she is today. In the course of time, following broad inundations and great continental uplifts throughout North America, that part of the Mississippi Valley known as Kentucky had been a land area for many, many ages. Broad-leafed, hard wood trees had not only displaced the Paleozoic fern tree swamps, but had become in their turn very ancient forests. Through the Coal Measures formed in those ancient periods now uplifted to thousands of feet in some places above sea level, the streams incessantly chiseling out their courses, had carved in consolidated sandstones, mud stones and limestones of the state, the topographic figure much the same as we see it and know it today.

As it had been the battle ground for a migratory and usurping vegetation again and again in the geologic past, so, at this later date it had again become a battle ground, but one preempted by fierce and hostile tribes of dusky aborigines from the north and from the south. Cherokees from the valleys of the Holston and Clinch rivers of Tennessee, and Shawnees from the broad forested stretches of the Scioto river, found in eastern Kentucky, as did the Chickasaws and other tribes in the western portion of our state, a happy hunting ground, but one in which there always lurked death and disaster at the hand of an am-

bushed foe. With varied mineral riches well within their grasp, these aborigines preferred to waste their time in slaughtering their distant kinsmen. Whether the grievances causing these conflicts were real or fancied, it is a fact that in the inability of the Indians to see and appreciate in the coals of this and adjoining states a great source of strength, and material advancement of their position, they had lost out in the coming struggle with the white man long before Columbus ever set foot on the soil of San Salvador in 1492.

DR. WALKER'S DISCOVERY.

Though La Salle in his hypothesized descent from the headwaters of the Allegheny to the Falls of the Ohio in 1669-70³ would have passed by the eastern Kentucky coal field, he left no record indicating that he found coal during these explorations. To Father Hennepin,⁴ a French Jesuit Missionary, who in 1679 recorded the site of a "cole mine" on the Illinois river near the present city of Ottawa, Illinois, must be given the credit for first noting the occurrence and practical use of coal in the United States. This ancient mine, however, was not in Kentucky, and though others are reported to have seen the boundary and interior of the state at various times from 1543 to 1700, it remained for Dr. Thomas Walker, on April 13, 1750, to be the first representative of the Caucasian race to discover and use the coal of Kentucky. Five years later, in 1755,⁵ coal was discovered in the Indian Territory north of the Ohio river in what is now the state of Ohio. In the same year Lewis Evans' map of the Ohio-Kentucky region was published showing coal in what is now Greenup and Boyd counties, Kentucky.

Dr. Walker's memorable discovery occurred, as his diary shows, the evening of the first day he set foot upon what is now Kentucky soil. Dr. Walker, who was an able, ingenious and observing civil engineer, as well as a physician, had been employed by the Loyal Land Company of Virginia on December 12, 1749, "to go to the westward in order to discover and prepare a place for a settlement."⁶ At the head of a small party he had toiled

³ Life and Writings of John Filson. R. T. Durrett, 1884, p. 32.

⁴ Mineral Resources of U. S. G. S. 1903 p. 24.

⁵ Mineral Resources of U. S. G. S. 1911, p. 25.

⁶ First Explorations of Kentucky. J. Stoddard Johnston, 1898, p. 33.

through the uncharted mountain valleys and passes of southwestern Virginia and Tennessee, and had come up to the vicinity of the Cumberland Gap early in April. His diary, which has been so ably interpreted by J. Stoddard Johnston, tells of his important discovery, and gives by way of inference, the first use of this mineral resource. The diary reads:



THE "BREAKS OF SANDY"

At this point the Russell Fork of the Big Sandy courses through a 1,000 foot gorge of the basal Coal Measures. No important coals are present in this rugged section due to the Pine Mountain uplift.

"April 13, 1750. We went four miles to a large creek . . . and from thence six miles to Cave Gap (Cumberland Gap) the land being level. On the north side of this gap is a large spring . . . this gap may be seen at considerable distance, and there

is no other. . . . At the foot of the hill on the northwest we came to the branch . . . that made a great deal of flat land. We kept down it two miles, . . . we came out on the bank where we found very good coal. I did not see any limestone beyond this ridge."⁷

It is easy to picture the scene that first night in Kentucky. The locality to which Dr. Walker came was Bell county, within two miles of the Cumberland Gap. It was the combined occurrence of good drinking water and an almost providential deposit of loose surficial coal which caused Dr. Walker to locate his first camp at this spot, which it may be noted was located on one of the strategic points of the old Warriors' Trail. At that time the English-American whites were on friendly terms with the Cherokees. Dr. Walker probably found no occasion to detour from the good path, or conceal his camp or its fire in any way. What thoughts must have gone through his mind and those of his party as they sat there that night toasting themselves before a good coal fire and reflecting on the rugged country they had already passed, and the unknown territory before them. Already familiar with coal in Virginia, where it had been discovered in 1701, and was at the time of his pilgrimage in its first process of operation,⁸ Dr. Walker announced his discovery of coal in Kentucky in most prosaic terms. He was to find and see a great deal of coal before he had completed the territory of eastern Kentucky. His diary states further:

"April 23. . . . We all crossed the (Cumberland) river (four miles below where Barbourville now is located). We traveled about twelve miles and camped on Crooked creek. The mountains are very small hereabouts, and there is a great deal of flat land. We got through the coal today."⁹

Dr. Walker had undoubtedly crossed what is now known as Knox county and a part of Laurel county and was in the region of the Pottsville Conglomerate on the Laurel river. We see further in his diary:

⁷ First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 48, 49 and 50.

⁸ New International Encyclopedia, 1920, Vol. V, p. 499.

⁹ First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 52 and 53.

"May 5—We got to Tomlinson river (a tributary of the Laurel river). Here is plenty of coal on the south bank opposite to our camp."¹⁰

This was undoubtedly the Inter-Conglomerate coal of eastern Kentucky which may be frequently seen in the cliffs along the streams of this section of the state.

"May 12—Under the rock (Pottsville Conglomerate) is a soft kind of stone almost like Allum. In passing below it a layer of coal twelve inches thick and white clay under that."¹⁰

At this time Dr. Walker was no doubt in the western part of Laurel county, and may have been on a southwestern flowing tributary of the Rockcastle river. Day by day the journey to the north, and finally around to the northeast and east continued. Though the diary of Dr. Walker does not record for some little time the occurrence of coal in his travels, there is little doubt but what he found it frequently and made use of it at his camps. These inferences are not to be regarded as remote, since we find that just before he leaves Kentucky he makes the following statement:

"June 19—We got to Laurel creek (head of the Tug fork of the Big Sandy) early this morning, . . . and attempted to cross a mountain, . . . this ridge is nigh the eastern ridge of the coal land."¹¹

Reading between the lines, one sees in Dr. Walker something of an able prospector, for he clearly delimits the extent of the Appalachian coal fields as far as Kentucky is concerned. Though great credit is due him for his perseverance and insight which made possible the discovery and use of coal by a white man in Kentucky 172 years ago, it must still be said in all fairness that he probably had very little conception of, and attached less importance to the future of the great industry which he had so casually opened.

GIST EXPORTS COAL.

Almost a year later Christopher Gist, another early and able surveyor in the employ of the Ohio Land Company of Maryland, set out from Oldtown, a point on the Potomac river, and circling

¹⁰ First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 58 and 60.

¹¹ First Explorations of Kentucky. J. Stoddard Johnston, 1898, pp. 70 and 71.

up through Pennsylvania and Ohio, came down into Kentucky in the spring of 1751. He had intended as were his instructions to go to the Falls of the Ohio to find agricultural lands, but being informed that warring Indians were in that vicinity, he drifted to the south and after merely glimpsing the broad level stretches of what is now known as the Blue Grass, plunged into the rugged foothills of the eastern coal field. Here he soon discovered the occurrence of coal, as his journal indicates.

"Wednesday, (March) 27, (1751) . . . On all branches of the little Cuttaway (Kentucky) river was plenty of coal, some of which I brought in to the Ohio Company."¹²

On the following day he again reports the discovery of coal as follows:

"Thursday, (March) 28, (1751) . . . set out south-east fifteen miles crossing creeks of the little Cuttaway (Kentucky) river. The land still being full of coal and black slate."¹²

He evidently regarded these mineralogical discoveries as of some considerable importance, for it is noted again on:

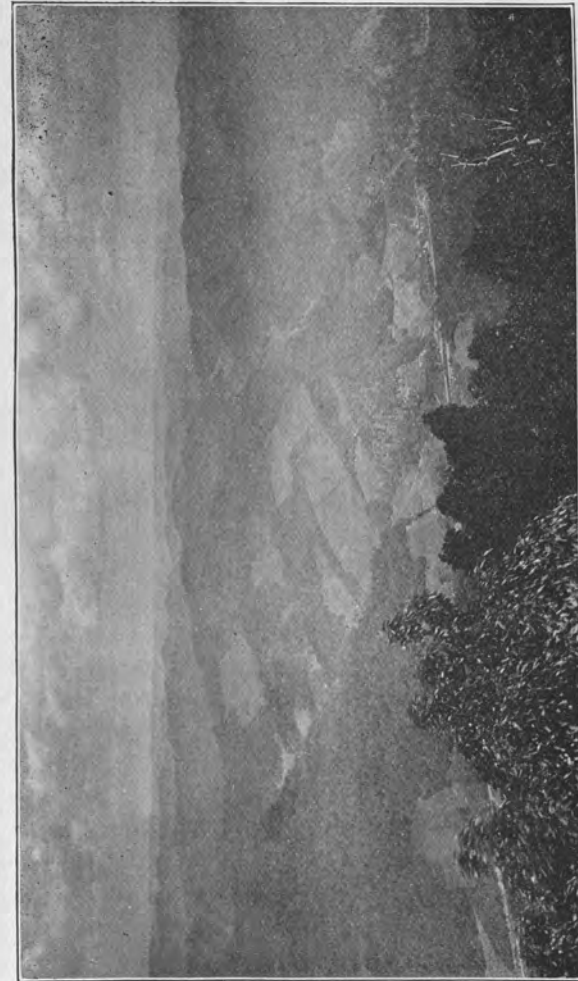
"Monday, April (1), 1751 . . . went down another creek to the Lick where blocks of coal 8 to 10 in. square lay upon the surface of the ground; here we killed a bear and encamped."¹³

To one who will read between the lines it is easy to redepict the scene which followed. Gist and his party, travel worn through many months spent in the wilderness of the Indian territory to the north, and now particularly wearied from the rough Kentucky country through which they had just come, found here food, comfort and repose. That the occurrence of coal for a fine fire was quite as much the cause of their encampment as the killing of the bear can hardly be denied. Gist at this time was very close to if not on the Warriors' Trail, for his journal shows that two days later, on Wednesday, without having traveled any very great distance, he came:

" . . . to a small creek on which there was a large warriors' camp, that would contain 70 or 80 warriors; their captain's name or title was the Crane, as I knew by his picture or arms painted on a tree."¹³

¹² First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 154.

¹³ First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 155.



THE ELKHORN COAL FIELD

The panorama is north across Letcher, Floyd, and Pike Counties from Lookout Peak (3,100 feet A. T.) of Pine Mountain, Letcher County, Ky. This photograph was taken by the writer in midsummer 1921. Jenkins, Ky., is located in the Elkhorn Creek valley below.

As in the case of Dr. Walker, however, the common occurrence of coal evidently soon palled upon the imagination of Gist, who fails to make further mention of it. He continued his journey of adventure across the ridges and valleys, on the tributaries to the North Fork of Kentucky river, and finally left the state through Pound Gap. He took back with him to his employers, the Ohio Company, specimens of the coals he found here. These were the first coals to be exported out of what is now known as the state of Kentucky. Although found within Virginia's western territory, Gist exported them, for he took them with him on May 17, 1751,¹⁴ when he passed through Wood's Gap (Flower Gap) from Virginia to his home on the Yadkin river in North Carolina.

KENTUCKY'S COAL UNAPPRECIATED.

With the breaking out of the French and Indian troubles in western North Carolina, western Virginia and southern Ohio in 1754,¹⁵ the migrations of those pioneers who might logically have followed in the footprints of Dr. Walker of a few years ago were held up indefinitely. The time was one of such gravity that many families actually returned eastward toward the old settlements of Virginia near the Atlantic.¹⁶ Among those who left their frontier homes to find security west of the mountains was Daniel Boone and his family. Such fragmentary records as come down to us deal principally with the border warfare which was at that time of infinitely more importance than any of the mineral resources of Virginia's western dominion. It was during this time, 1754 to be exact, that John Filson tells us that James MeBride made his pilgrimage across this state and cut his name on a tree at the mouth of the Kentucky river.¹⁷ While he was certainly not the discoverer of Kentucky, as Filson claimed, he is illustrative of that group of intrepid explorers who continued their pilgrimages through this state even during this period of extreme hostility, and of whom only partial and in many cases unreliable information is now to be secured. These men all came to Kentucky looking for broad, rich agricultural lands, well

¹⁴ First Explorations of Kentucky. J. Stoddard Johnston. 1898, p. 162.

¹⁵ History of Southwest Virginia, Summers. 1903, pp. 55, 56 and 57.

¹⁶ Daniel Boone. Thwaites. 1909, pp. 42, 43.

¹⁷ History of Kentucky. Collins. 1882, p. 519, also Life of John Filson. Durrett. 1884, p. 31.

adapted to the plantation scheme of farming so well worked out in central and eastern Virginia. They were, for the most part, not interested in any of the mineral resources of the new area, and if they made any personal use of such coals as they may have found in their rambles, they probably failed to record it, since they regarded them as of little consequence.

The treaty of Fountainebleau made by the French and English in 1762 resulted in a gradual cessation of Indian hostilities,¹⁸ and in 1769, that memorable year, Boone with his party started what has come to be known as the "great invasion."



A VIRGIN COAL FIELD

The Henry Skidmore homestead of 600 acres on Martin's Fork of Cumberland River. In this part of Harlan County several excellent coals await an extension of the railroad and actual development.

Consisting of but small and infrequent groups at first, these hardy pioneers and their families treading the Wilderness Trail became more and more frequent, until in the latter part of the 18th century the stream of homeseekers was an almost continuous one. Thousands thus found their way into what was to be Kentucky. Such fragmentary records as are preserved speak of the hardships of the journey, the dangers from the Indians, and the allurements of the promised land. While it must be admitted these pilgrims had for their first and guiding motive a new,

¹⁸ History of Southwest Virginia. Summers. 1903, pp. 76-78.

cheap and good agricultural location, it is impossible to believe that in passing through the rich coal fields of southeastern Kentucky they did not notice and make use of such coals for their fires as were readily available.

John Filson published his book¹⁹ in 1784, and included with it a map of the same date showing the Wilderness as well as the Warriors' Trails passing through Lincoln and Fayette counties. He makes a considerable point in describing the agriculture and climate of Kentucky, and on his map takes pains to locate the Stations, Forts, Salt Springs, Licks, Towns, Building Houses, Mills and Wigwams. In eastern Kentucky he indicates the mountain region, but he does not show a single coal outcrop or mine. It may be thus surmised that at this time the great coal fields of this state played a very small and insignificant part in the domestic and industrial life of the new Commonwealth. Throughout his book,¹⁹ there is no mention made of the vast coal deposits of Kentucky.

¹⁹ Discovery, Settlement and Present State of Kentucky. Filson. 1784.



CHAPTER II.

A NEW KENTUCKY INDUSTRY.

Yet with the growth of the population, it was only to be expected that interest would eventually develop in the mineral resources of the new area; so we find that a few years later a number of prospectors have been making investigations throughout the state.²⁰ Imlay in his fascinating book speaks authoritatively of salt springs, beds of coal, limestone, clay for brick making, etc. Speaking of the mineral deposits of Kentucky, he says:

“ . . . It is particularly favorable that this mineral (coal) lies at the heads of our larger rivers; as it can be sent down with the greatest facility, . . . ”²¹

Imlay's statements have been more than substantiated by subsequent experience. James Hall, whose portraiture of early Kentucky is unsurpassed, when traveling through the Ohio Valley and Kentucky during the first half of the nineteenth century availed himself of Imlay's economic information, and noted its accuracy.²² Towards the last of the 18th century the economic demand for home-made hardware, implements of steel and iron, became so great, due to the rapid increase of the population, that we find in 1790²³ the first iron furnace to be constructed west of the Allegheny mountains was built near Owingsville in Bath, then Bourbon county. The ore here used was a siderite which had weathered from an original limonite, a residual of the Onondaga limestone.

Though wood charcoal was used in its smelting, Kentucky coals found their first real industrial use in the forging of refined products made from this iron ore. Stoves, other domestic utensils, and hardware were made on Slate creek, a branch of the Licking river; and in 1814, during the second war with England, four-pound cannon balls were cast here and wagoned to the Licking river. Thence they were shipped by flat boat to New Orleans where General Jackson used them in his engagements with the

²⁰ Topographical Distribution of the Territory of North America. G. Imlay. 1792.

²¹ A Topographical Description of the Western Territory of North America, etc. G. Imlay (map), Samuel Campbell, N. Y. 1793, p. 125.

²² Sketch of the West. James Hall. 1835, Vol. 2, pp. 103-104.

²³ Geology of Kentucky. Miller. 1919. Series 5, Bulletin 2, pp. 307-308-309.

British. A number of cannon balls of this date and manufacture are still found occasionally in this section, and a number of them are held by antiquarians as relics of this state's early development. The iron industry in Kentucky was in a large degree responsible for the first prospecting and early development of the coal industry in this state. As late as 1853, Mather in making a reconnaissance for the promoters of the Lexington and Big Sandy Railroad notes the operation of coal mines in the north-eastern district in conjunction with the Star Furnace, Buena Vista Furnace, Clinton Furnace and Mount Savage Furnace.²⁴

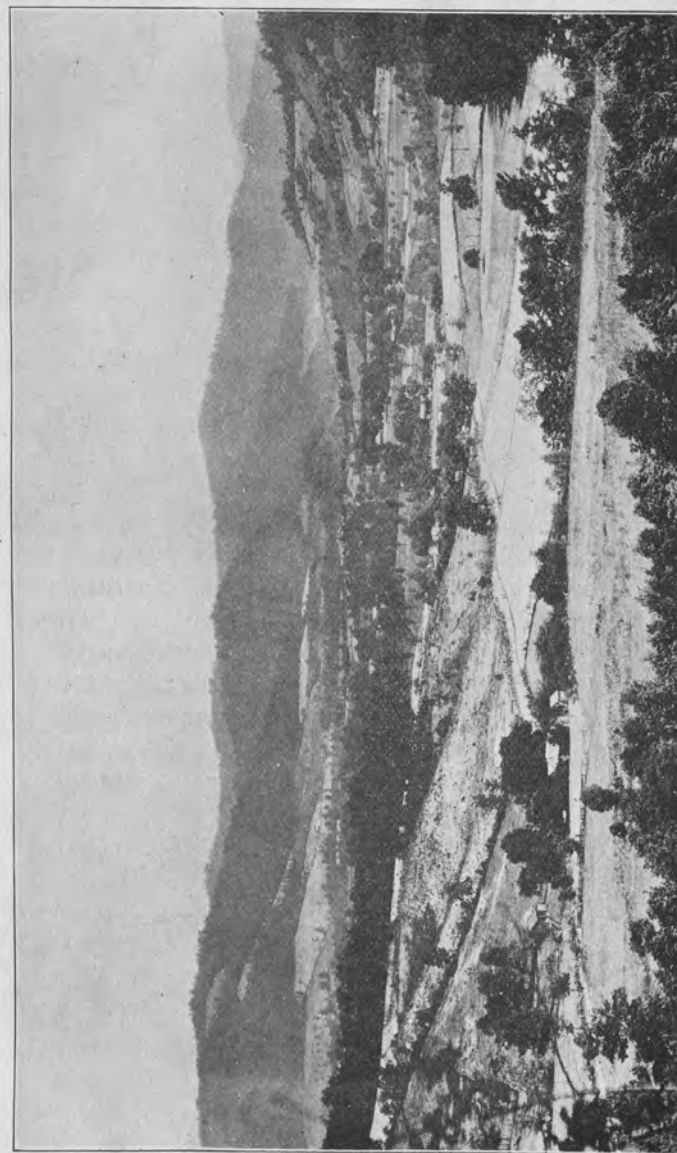
DEVELOPMENT AFTER STATEHOOD.

With the establishment of statehood in 1792, and the growth of a more permanent and stable economic and political relationship, the development of municipal centers at Lexington and Louisville, and elsewhere, there began to grow up a substantial and continued demand for coal for heating and industrial purposes. The coal banks adjacent to the navigable and semi-navigable streams of eastern and western Kentucky were searched for their available coal, and these began to be studied in a sporadic way by the natives, who loaded home-made flat boats and took them down with the tide to points from which they could be distributed by wagon. Lexington, as well as some of the other smaller cities of the Blue Grass area, being somewhat removed from the Kentucky river in distance, had but a small coal trade for many years. The steep ascent from the Kentucky river gorge made it practically impossible for this section of the state to secure as large quantities of cheap coal as the trade demanded. In 1805 Lexington is reported to have consumed about 13,000 bushels,²⁵ or 494 short tons. This amount of coal could easily be carried in a few coal cars. At Frankfort and Louisville, however, these obstacles were not encountered. The capital city of Kentucky, much smaller than Lexington, consumed about 200 tons per annum, and Louisville, the largest municipal consumer in the state, had an abundant supply of very cheap coal from Kentucky river mines in the Ohio river traffic. The coal indus-

²⁴ Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell, 1854, pp. 9 and 10.

²⁵ History of Kentucky. Collins. 1882, pp. 407, 408.

↑
full name?



COAL MEASURE TOPOGRAPHY NEAR WILLIAMSBURG.
This view shows Raines Mountain in the distance and Briar Creek valley in the foreground from Barker Mountain. It is taken at an angle of S. 65 E. from an altitude of 1,320 feet above sea level. The Jellico and Blue Gem coals are operated successfully in this region.

try grew apace in these localities, as a number of early newspaper items²⁶ and miscellaneous records show. At the same time coal lands in Kentucky were cheap, difficult to dispose of and commonly traded in barter for tobacco, flour, beef, pork or whiskey. Francois Andre Michaux, a Frenchman of real ability, in traveling down the Ohio river in 1802, notes in respect to northeastern Kentucky that: "The chalky stone and abundant coal mines which lie useless are the only mineral substances worthy of notice."²⁷

The first quarter of the 19th century was one of broad intellectual, agricultural and industrial development in Kentucky. Transylvania University, at Lexington, Ky., founded a chair of Natural Science, which was filled by Constantine Smaltz Rafinesque²⁸ in 1819. Though interested principally in botany, Rafinesque's unusual and eccentric talents found no limit for their application. He claimed for his own the whole field of science, including geology. While his observations were many and generally of a discerning character when within his own particular field of botany, conchology, and ichthyology, his geological conclusions as revealed in his "Ancient Annals of Kentucky,"²⁹ are not only impossible, but grotesque. He says: "By operation of submarine volcanoes, the strata of coal, clay and amyglavid are formed and intermixed at various and intermittent times with the above strata."³⁰ With such an erroneous conception of the geology of coal held by those of supposed scientific authority, is it any wonder that the development of this great mineral resource of Kentucky was so long delayed?

INDUSTRIAL EXPANSION.

Although for many years during the early part of the 19th century Kentucky cities and villages located along the Ohio river made use of a great deal of Pennsylvania and West Virginia mined coal shipped in barges down this natural thoroughfare, the uncertain nature of this traffic, due to the lack of adequate

²⁶ History of Kentucky. Collins. 1882, pp. 407, 408.

²⁷ Travels to the West of the Allegheny Mountains in . . . Ohio, Kentucky and Tennessee . . . undertaken in . . . 1802. F. A. Michaux. 1805. London. Rept. Ed. by R. G. Thwaites, 1904, Cleveland, p. 223.

²⁸ Life and Writings of Rafinesque. R. E. Call. Filson Club. 1895.

²⁹ International Encyclopedia, 1920. Vol. 19, p. 482.

³⁰ History of Kentucky. Marshall. 1824, pp. 9 to 39.

³¹ History of Kentucky. Marshall. 1824, p. 14.

repositories along the river, tended gradually toward its discontinuance.³¹ The fact that all of Kentucky's streams of any im-



DETAIL OF THE HAZARD COAL

This facing shows a good bed section of the Hazard seam. It is the property of the Hazard Coal Corporation in Perry County, Kentucky.

portance find either their headwaters or middle courses in Kentucky coal fields began at this time to facilitate the development of the coal industry of this state. The expansion was not, however, as rapid as might have been expected for several reasons.

Kentucky streams have always been subject to high and low water, and these conditions before the improvement of the river by locking became gradually worse than better, due to the gradual deforestation of the highland watersheds. River traffic was, therefore, subjected to short and uncertain periods of fairly high water, which unfortunately were the identical periods in which large amounts of timber, both loose and rafted, were floated down the streams. The logging industry was, therefore, a serious handicap to the coal barging or flat boat industry; and although the amount of coal mined and shipped from Kentucky by river continued to grow, it did so in the face of great handi-

³¹ United States Census. 1880. Vol. 15, pp. 893-894.

caps.³² With the construction of the Frankfort and Lexington railroad, in 1835, it was expected that a Blue Grass outlet would be provided for the Kentucky river and mountain traffic; but due to the transfer of goods required at Frankfort, this freight business did not materialize.³³

It is uncertain at what exact date the production of coal in Kentucky for intrastate transportation and use began to take real form. The extent of the coal fields and many of their best seams were known to the natives and interested public as early as 1810. In 1820 William D. McLean opened what became known later at the "McLean drift bank," on the Green river, and this mine is regarded as the first commercial operation in the western coal field.³⁴ During the '20's there appears to have been a considerable movement looking toward the development of Kentucky coal for industrial and domestic purposes. The No. 11 or Herrin coal about five feet in thickness was opened and operated by several small mines at Bon Harbor in Daviess county as early as 1825.³⁵ Statistics are available showing that 328 short tons of coal were mined and sold in Kentucky in the year 1828.³⁶ From thence on, the development is one of continuous expansion.

By 1830 the volume of coal produced in Kentucky had grown to 2,000 tons, and in 1837 it was 10,000 tons. During this decade Mud river coal was wagoned with ox teams in a three-day haul to Russellville, and Green river barges became the recognized source of coal for Evansville,³⁷ Indiana, and Henderson, Kentucky. The late thirties witnessed a notable increase in the interest in coal and iron developments of the state. David Trimble, speaking before the Kentucky legislature, under date of February 12, 1838,³⁸ says:

"No geological surveys have as yet been authorized by the state, and no scientific researches or investigations have been made by individuals. All that is known has been collected from

³² Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell, 1854, p. 12.

³³ Kentucky River Navigation. Verhoeff. Filson Club, 1917, p. 109.

³⁴ Coal Mining and Its Bearing on the Coal Industry. Ky. State Hist. Soc. Reg., Vol. 12, No. 35, May, 1914, Rothert, pp. 33-36.

³⁵ History of Daviess County. Inter-State Pub. Co., 1883, pp. 251-252.

³⁶ Mineral Resources of the U. S. Geol. Survey, 1906, p. 580.

³⁷ Coal Mining and Its Bearing on the Coal Industry. Ky. State Hist. Soc. Reg., Vol. 12, No. 35, May, 1914, Rothert, pp. 33-36.

³⁸ Ky. House Journ., 1837-1838, pp. 466-485.

men of business or men in search of subsistence, and not from men of science. . . . The existence of coal and iron ore was known to the first settlers of the country, but at that period and for many years thereafter the inducements to explore the wilder-



MODERN MINE EQUIPMENT ON CLOVER FORK

It has been truly said that the rapid growth of the coal production of southeastern Kentucky has been due in a large measure to the installation of extensive modern coal mining machinery. Snowy or rainy weather has no terrors for mines so equipped. This loaded mine train was snapped on the Clover Fork during zero weather in 1921.

ness in search of either were not sufficient to justify the expense and loss of time; but the demand for coal and iron has increased so much and is increasing so rapidly that the necessary and proper examinations cannot be much longer delayed. Even now people of the rich limestone lands are looking to the hills for future supplies of coal for fuel, and the iron interest is of too much importance to the community at large to be much longer forgotten or neglected."

It was indeed a time of awakening for Kentucky from a mineralogical standpoint, and the Committee on Internal Improvements of the state made history when it succeeded in securing the adoption of resolutions instructing the Governor to appoint

an able geologist to make a reconnaissance of the mineral and agricultural resources of Kentucky. Governor Clark selected Dr. William Williams Mather,³⁹ of New York, whose report consisting of forty pages was published by the state in 1838, and is the first authentic paper on the coal and mineral resources of Kentucky.⁴⁰ Separate copies of this early geological report are now exceedingly rare, and only one or two are believed to be in existence besides the copy now in the Kentucky Geological Survey library at Frankfort. After calling attention to the great variety of undeveloped mineral resources in the state, outlining the two Kentucky coal fields, and estimating roughly their potential value, Mather gave suggestions for the formation of a geological survey.

KENTUCKY GEOLOGICAL SURVEY ESTABLISHED.

Nothing was done, however, in this respect until 1854, when, following the passage of authorizing legislation in the General Assembly, Governor Lazarus W. Powell appointed Dr. David Dale Owen, of New Harmony, Indiana, State Geologist of Kentucky.⁴¹ Owen organized the first Kentucky Geological Survey immediately, and began forthwith the publication of detailed investigations outlining the definite extent of the eastern and western coal fields, and the correct enumeration and qualitative study of many coal seams. Unfortunately he and his assistants confined themselves closely to the geology of their subjects, and their reports for this reason contain very little information throwing light on the development of the coal industry in this state up to 1854.

The growth of the coal industry in Kentucky, however, had proceeded apace, each year witnessing the addition of several thousand tons to the aggregate production. In 1840 the amount had increased to 23,527 tons, which in 1845 had more than quadrupled itself to 100,000, and this was increased one-half again to 150,000 tons in 1850,⁴² by which time a large number of wagon

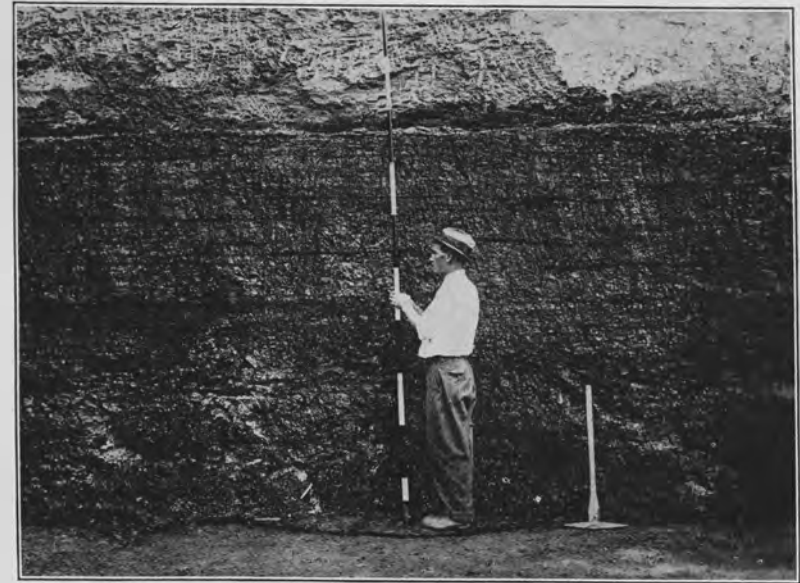
³⁹ History of the Kentucky Geological Survey, 1838-1921. W. R. Jillson, Register of the Ky. State Hist. Soc., Vol. 19, No. 57, Sept., 1921, p. 91.

⁴⁰ Jour. Ky. Senate, 1839. Appendix, pp. 253-292.

⁴¹ History of the Kentucky Geological Survey, 1838-1921. W. R. Jillson, Register of the Ky. State Hist. Soc., Vol. 19, No. 57, Sept., 1921, p. 95.

⁴² Production of Coal in Kentucky, Bulletin No. 4, Series 5, Ky. Geol. Survey, 1921. W. R. Jillson, pp. 160-161.

and river bank or barge mines had been opened on the Big Sandy, Licking, Kentucky, Cumberland, Green and Tradewater rivers. In the western coal field of Henderson⁴³ county a number of



THE PRIDE OF EASTERN KENTUCKY

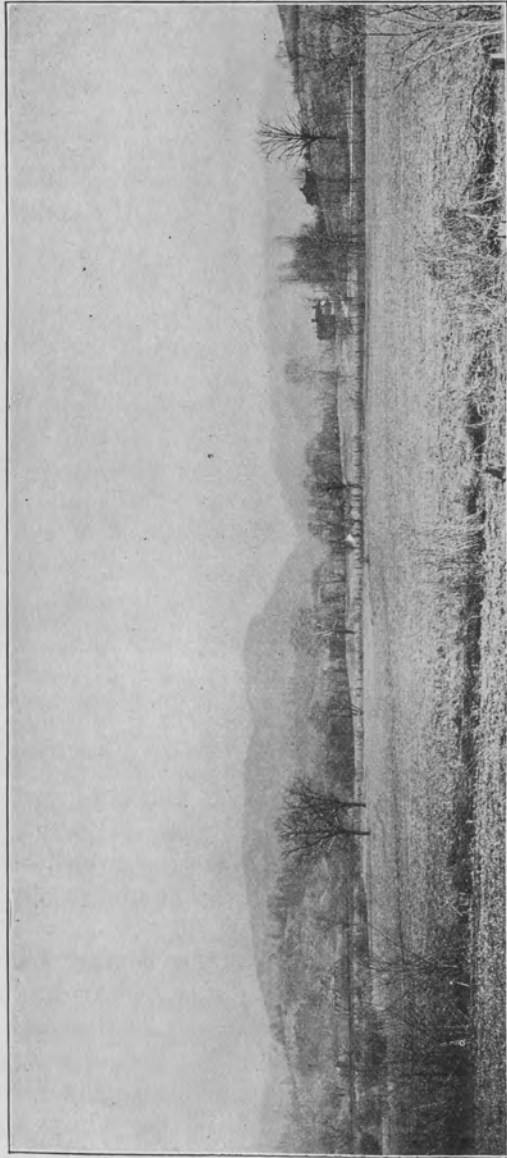
The view shows seven and a half feet (ninety inches) of Elkhorn coal at Jenkins, Letcher County, Ky. This property is operated by the Consolidation Coal Company. The Elkhorn coal is very low in sulphur and ash and high in heat units. It has no equal for many industrial purposes.

small surface mines were in operation at this time, and to the south in Muhlenberg county one of the old coal properties in this portion of the state, the Mud River Mine, which had been opened in 1830, was enjoying a rather large and profitable development by river barging and wagons.⁴⁴

At the time of the construction of the Lexington and Big Sandy railroad, now the Chesapeake and Ohio railroad, was being proposed in 1853, William Williams Mather was again brought into Kentucky to report upon the economic geology and mineral resources between Lexington and Ashland along the proposed route. After disposing of the other minerals of the region he calculates that at that time enough coal is to be found

⁴³ History of Henderson County. Starling, 1887, p. 130.

⁴⁴ History of Muhlenberg County. Rothert, 1913, pp. 391-392.



THE CUMBERLAND MOUNTAINS
Looking southwestward across the Middlesboro plateau, a charming view is obtained of the Cumberland range and Pinnacle Rock. These sharp topographic features are formed by sharply tilted beds of the Lee sandstone the basal part of the Coal Measures of Kentucky.

in this region to last 200 years on a basis of the transportation of 600,000 tons per annum, which it must be remarked was a stupendous figure for that day and time. He says further: "Lexington and the country along and near the railroad line in that vicinity have been partially supplied with coal from the Kentucky river, but the expense and risks of transportation have been too heavy to bring the coal into general use."⁴⁵

CIVIL WAR DEPRESSION.

At the time of the beginning of the Civil War the coal production in Kentucky had reached the then large figure of 280,000 tons per annum. This volume, however, began to decrease, and had dropped to 200,000 tons at the close of the hostilities in 1865. When one reflects on the widespread and continuous social, political and industrial disruption of Kentucky during this terrible period, the wonder grows that a volume as large as that recorded could have been produced. During the reconstruction period, the industrial depression of the state and the inability of domestic consumers to pay for many things which then as now were considered household necessities is reflected in the greatly decreased amount of coal produced. In the year 1870 the volume of Kentucky mined coal had been reduced to 150,582 tons.⁴⁶

⁴⁵ Geological Examination of the Lands Through Which Passes the Lexington and Big Sandy Railroad. Mather. Pub. Pudney & Russell, 1854. P. 11.

⁴⁶ Production of Coal in Kentucky. Bull. 4, Series 5, Ky. Geol. Survey W. R. Jillson, 1920, p. 161.



CHAPTER III.

THE COAL INDUSTRY REBORN.

Fortunately, the civil War depression was of short duration. With the general introduction of powder for mining coal in both the eastern and western coal fields in the latter '60's,⁴⁷ and the reorganization, consolidation, expansion and improvement of many of Kentucky's "short line" bankrupt railroads, during the '70's, the industry at once came back and grew at the rate of about 100,000 tons per year until 1879, when the 1,000,000 ton mark was reached.

This large volume of increase reflects not only the opening of new mines and increased demand throughout the state and the Ohio river valley, but the gradual introduction of new mining methods whereby labor and overhead costs of mining were reduced, and daily tonnage was at the same time increased. The old-fashioned candles and Dutch lamps came to be displaced by new inventions burning oil, and later, carbide. Heavy steel wedges and sledges, and iron rakes, so essential to the early coal miner's "kit," were abandoned in favor of new hand drills and scrapers, which later came to be greatly improved upon by the application of electricity. Man labor on the mine cars was replaced by mules, and these in turn by electric motors driven over steel tracks instead of loose wooden rails.

More recently, the practice of hand undercutting and auger drilling followed by the dangerous antiquated method of shooting from the solid, common during the '80's and '90's, has been abandoned. Electrically operated steel chain cutting machines, drills and shooting devices have taken their place. The industry constantly troubled with growing pains has appropriated hundreds of new devices to alleviate its internal congestion and speed up production. Foremost among these must be mentioned modern ventilating systems making use of continuous motor driven blowers, which have greatly improved conditions in Kentucky coal mines from the operator's as well as the miner's standpoint.

⁴⁷ History of Muhlenberg County. O. A. Rothert, 1869-70, p. 394.

The recent tendency towards standardization of mine operation, the employment of scientific methods beneath the surface, and the economic construction of tipples and miscellaneous equipment throughout has been largely responsible for the wonderful growth of the industry in Kentucky during the last few years.



FACE OF NO. 9 COAL, ARNOLD MINE

This operation is controlled by the St. Bernard Mining Co., of western Kentucky. The coal bed section here shown is $4\frac{1}{2}$ feet thick with slate roof and fire clay bottom in east 30 room 14,450 feet from the main entry.

To these fundamental factors must, of course, be added the all-important headwaters extension of Kentucky's mountain railroads during the last two decades. These railroad extensions have made possible the entrance into this state of the Alladin-like great corporations which with almost unlimited capital have undertaken the operation of unit coal fields such as the Elkhorn, in which scores of mines built around new and especially constructed sanitary mining towns are operated under a single management.

LABOR TROUBLES.

The development of the coal fields of Kentucky, like that of every other field in the United States, has not been accomplished without a number of unfortunate misunderstandings between the owners and their employes. During the early years

of this industry in Kentucky the mines were so largely operated by unorganized native labor that there was really little cause and no opportunity for concerted action on the part of labor. The general conditions were all that could be expected at the time, and there was little dissatisfaction. Shortly following the coming of the paid union worker and agitator and their attempts to organize the miners, especially in the western field, there developed the first strikes. One of the earliest and most notable of these was the strike of 1886-87 caused by the demands of the miners for the appointment of check weighmen, *i. e.*, a person to represent them and paid by them to weigh their coal.⁴⁸

In 1889 there was a three months' strike in the Jellico region which was chiefly responsible for the year's shortage. Estimates received from the mine operators placed the loss due to the strike at not less than 1,000,000 bushels⁴⁹ or 60,800 tons. This, with the mild winter, caused the coal production of Kentucky for the year 1889 to fall below that of 1888, when the production in the state was 2,570,000 tons. The production for 1889 was 2,399,755 tons. Eight years later, 1897, Whitley county fell from the second to fifth place in the line of production due to an extended strike in the Jellico district.⁵⁰

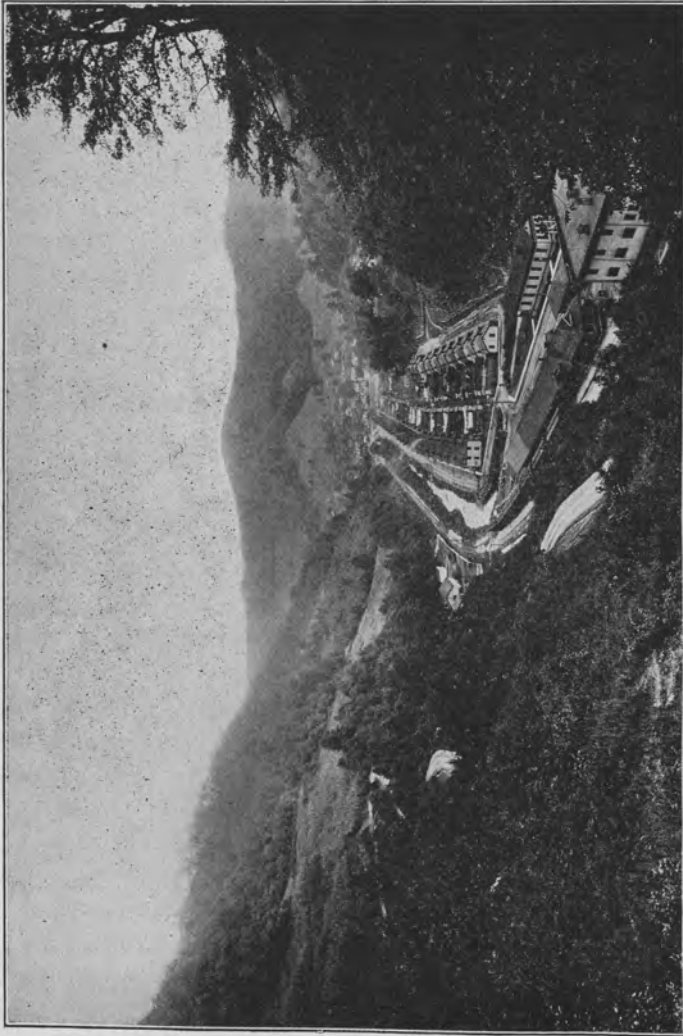
Small or localized disturbances have been experienced at different times in the western Kentucky coal field from this date on, but nothing approaching a large tie-up of the industry occurred until a drivers' strike started in Central City in April of 1920. In the confusion which followed the general walkout, other mines became more or less involved, and for a time the situation appeared very threatening, but was finally settled at the end of six weeks, not, however, without a considerable loss in production.

During the last five or ten years probably the most severe labor disturbance that has ever affected the coal industry of Kentucky occurred in the Tug Fork section of Pike county, Kentucky, and Mingo county, West Virginia, centering about Williamson, Chattaroy and Mattewan. Although a number of intricate and somewhat confused principles have been involved

⁴⁸ Third Annual Report, Kentucky Inspector of Mines, 1886. Norwood. p. 11.

⁴⁹ Sixth Annual Report, Ky. State Inspector of Mines, 1889, p. 9.

⁵⁰ Report, Kentucky Inspector of Mines, 1897. G. W. Stone, p. 30.



A. SPLENDID EASTERN KENTUCKY COAL TOWN
The view is of Fleming, Letcher County, Ky., from the automobile road above the L. & N. R. R. station. This is one of the newly built coal towns of the Elkhorn Coal Co. Wheelwright, Wayland, Weeksbury, Jenkins, and McKoberts are other new towns of Letcher and Floyd Counties belonging to the same class.

in this strike, the real issue seems to have been the attempt of the United Mine Workers branch of the American Federation of Labor to unionize the Kentucky and West Virginia mines of this district in the face of opposition of the operators and a considerable percentage of the native mine workers themselves. The conflict early in 1921 assumed serious proportions and literally became a real border warfare between armed bodies of guards and outlaws.

During the year 1922 both Kentucky and West Virginia state troops were called in to restore order. It was finally only through the intervention of President Harding, with the dispatch of a regiment of U. S. Infantry and machine gun units, that peace and order were secured. This same executive order operated to turn back a body of 5,000 unionized miners, who had started from other points in West Virginia to march into the Williamson area, and thus further complicate the situation. Though not at the present settled, this titanic labor struggle of the hills of eastern Kentucky and West Virginia gives promise of some sort of reasonable solution in the near future. Needless to say, its extent geographically, and duration, seriously impaired the production of Kentucky coal for the years 1920-21 from the Pond Creek region of Pike county, where a loss of 300,000 to 400,000 tons is estimated to have been sustained.

REMEDIAL COAL MINING LEGISLATION.

With the rapid increase in importance of the coal mining in Kentucky, legislation looking toward the control and safeguarding of the industry began to be enacted by the Kentucky General Assembly towards the latter part of the 19th century. In 1884 the state legislature created the office of State Inspector of Mines, and Prof. C. J. Norwood, who had been employed as assistant geologist by Prof. Nathaniel Southgate Shaler and Mr. John R. Procter, on the 2nd Kentucky Geological Survey, was appointed to the new office by Governor J. Proctor Knott.⁵¹

The old trouble between the operators and miners concerning the amount of coal mined was settled on May 18, 1886, when a bill was passed through the State Assembly providing for a

⁵¹ First and Second Annual Report of the Ky. State Inspector of Mines, 1884, p. 5.

check weighman for miners where there were as many as 20 miners employed in a mine and the majority of those employed in any such mine demanded the services of a check weighman.⁵²

In 1887, the General Assembly passed a law regulating the ventilation of mines.⁵³ This was the beginning of artificial ventilation of all operations. Heretofore, with few exceptions, natural ventilation had been the only means provided. In 1892, a bill was passed by the legislature which provided for an assistant inspector of mines.⁵⁴ A year later, by legislative action, the State Inspector of Mines was made the Curator of the Kentucky Geological Survey,⁵⁵ which as directed by John Robert Procter had just been abolished.



THE HARDY-BURLINGHAM MINING CO.
This operation is located in the heart of the Hazard coal field on the North Fork of the Kentucky River at Harburlly, Ky. A double or two track tipple shown the left with mines on either side.

In 1898 a law was passed by the General Assembly requiring the coal mining companies to pay their employes before the 16th of the month following the month in which the service was rendered. This bill also made it illegal for coal companies to coerce their employes into buying their supplies from any certain store or corporation.⁵⁶

⁵² Report Kentucky State Inspector of Mines, 1894, p. 200.

⁵³ Report Kentucky State Inspector of Mines, 1889, p. 6.

⁵⁴ Report Kentucky State Inspector of Mines, 1892, p. 3.

⁵⁵ Report Kentucky State Inspector of Mines, 1893, p. 5.

⁵⁶ Report Kentucky State Inspector of Mines, G. W. Stone, 1900, pp. 286-287.

The employment of children in Kentucky coal mines had become somewhat general in the late '90's, and in 1902, there was a Child Labor Law⁵⁷ passed affecting mine employes. This law made it illegal to employ a child under 14 years of age in the mines. A miners' oil law was passed in 1906,⁵⁸ which required all oil used for illuminating purposes in the mines to be inspected and approved by the chief mine inspector. The State Mine Inspector had urged the passage of this bill in every report from 1892 to 1906, when it was passed. In the same year a bill was passed authorizing the chief mine inspector to settle all disputes between employers and employes in regard to the mine scales for the weighing of coal.

The child labor law was amended in the same year, limiting the labor hours of work of children under 16 years of age. Additional constructive legislation was written in 1908. These new statutes required mine foremen to pass an examination held by the chief inspector of mines with two assistant inspectors, before they were eligible for the position of mine foremen.⁵⁹ Following a tendency of recent years, the General Assembly of 1920 passed legislation regulating wash rooms and other sanitary conveniences for coal mines.⁶⁰

KENTUCKY COAL MARKETS.

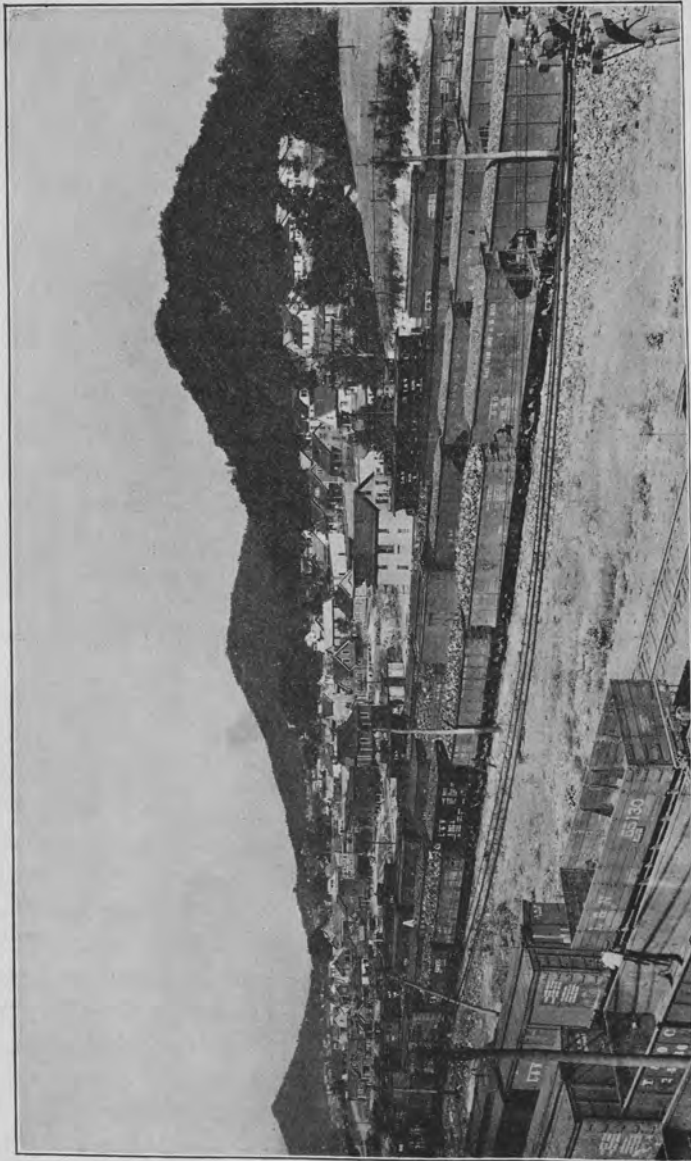
From the earliest times, as was only natural, a very considerable portion of the coal produced in Kentucky was consumed within the state. In the days of the infancy of the industry, however, the percentage of Kentucky coal used by Ohio river towns was not as large as it might have been, due to a popular prejudice in favor of Pennsylvania river barged coal. This trend of public feeling was justified about the middle of the 19th century, due to a really inferior grade of coal produced by a number of our river mines. With the larger development of the industry in the '80's, this undesirable fuel which had always constituted a small part of the total production was forced by a growing competition out of the market. Yet Louisville in 1884-

⁵⁷ Report Ky. Inspt. of Mines, 1902, p. 15, on mining laws—form given.

⁵⁸ Report Ky. Inspt. of Mines, 1905-6, p. 248, form of both laws given.

⁵⁹ Report Ky. Inspt. of Mines, 1908, p. 7, reference to law.

⁶⁰ Acts of Gen. Assembly of Ky., 1920, Chapter 20.



AN EASTERN KENTUCKY COAL FIELD GATEWAY
 All of the coal produced in that part of the southeastern coal field lying on the North Fork of the Kentucky River is moved over the L. & N. Railroad through these extensive yards at Ravenna, Kentucky.

85, consuming annually 500,000 to 600,000 tons,⁶¹ purchased only a small percentage of the Kentucky product, and Cincinnati with a total annual consumption of 1,675,841 tons used no Kentucky coal except a small portion of the product of the mines of Boyd and Lawrence counties. The greater part of the production of the mines of this section of Kentucky adjacent to the Cincinnati Southern Railway which was exported went, not to the north, but to the southern markets. During this decade, it will be seen, Kentucky coals were not known and did not have a reputation in the northern industrial centers. This reputation had to be established before the market was ready to accept the product of this state in large quantities. The absence of any large industrial demand within Kentucky then as now, coupled with this unfortunate lack of information concerning Kentucky coal in the north, operated effectively to retard the development and hold down the total production of the state for many years. In 1889 the completion of the Chesapeake and Ohio Railroad from Ashland to Cincinnati gave an outlet to a much increased production in the northeastern district to new markets in Chicago and the northwest⁶² generally.

It is a fact well remembered by the older generations that the development of Kentucky coal fields, especially the eastern field, passed through a remarkable "boom" during the middle '80's, which for a time facilitated all operations, but later had a very retarding effect. About the year 1886, a great deal of interest in the exploitations of several portions of the eastern coal field developed in promotion circles in Louisville. A Mr. F. D. Carley started a land and mineral corporation, and built a railroad to Jackson, in Breathitt county. In 1890 this corporation had 50,000 acres upon the waters of the Kentucky river. The coal promotion craze spread like a grass fire. English capitalists founded Middlesboro and published much concerning it.* Louisville promoters undertook to do the same for Pineville, Barbourville, Beattyville, Ky., and Big Stone Gap, Virginia. The Louisville and Nashville railroad was extended to Cumberland Gap and up Powell's Valley, Virginia, to meet the Atlantic connection of the Norfolk and Western railroad. Iron furnaces

⁶¹ First and Second Rep., Ky. Inspt. Mines, 1884-85, pp. 18, 19, 20.
⁶² Sixth Ann. Rept. Ky. Inspt. Mines, 1889, p. 9.
 *Log Mountain, Clear Creek Region, A. R. Crandall, 1890.

were built at Middlesboro which became greatly overboomed. Building frontages sold as high as \$400.00 per foot that had been worth little or nothing a few years previously. The boom began to deflate itself about 1890, and in 1893⁶³ the general panic reduced eastern Kentucky coal lands and town property to its then actual value. But the havoc wrought was not repaired for a number of years to come.

The fine qualities of the coal of Kentucky, however, gradually forced their own way into the open market. In 1892, market studies show that Louisville had increased her consumption of Kentucky mined coal from 124,159 tons in 1884 to 412,443 tons,⁶⁴ or 232% in eight years. Yet contemporary history says:

“ . . . Notwithstanding the large amount of coal brought to Louisville by rail (Kentucky coal), there has been no decrease in the amount of Pittsburg coal brought here, the Kentucky coal rarely keeping pace with the increased annual consumption.”⁶⁵

The World's Fair in Chicago in 1893 provided the means for a most rapid national educational program concerning the coals of Kentucky and their respective merits. This opportunity was seized by the state with splendid results. The following relative to coal is taken from a letter⁶⁶ to the Inspector of Mines from Col. M. H. Crump, of Bowling Green, who had charge of the Kentucky Mineral Exhibit: “The exhibit attracted great attention, and was excelled by no state in the Union, and was only equalled by West Virginia in its quality and excellence . . . more than 30 awards, carrying medals and diplomas, setting forth the various qualities of the coal, were received. It was a source of much surprise to the world to find that Kentucky claimed to be a mineral state, as theretofore it had been known chiefly from its livestock and agricultural products. In cannel coal it far exceeded any other state. . . . No less than 50 papers, from Maine to California, reproduced the . . . description. Not less than 400,000 visitors passed under the arch and inspected, more or less critically, the exhibit; of these, more than 75,000 left their names upon the register. . . ”

Statistics of Kentucky coal development follow:

⁶³ Memorial History, Louisville, J. S. Johnston, 1896, Vol. I, p. 113.
⁶⁴ Rept. Ky. Inspt. of Mines, 1892, p. 50.
⁶⁵ Memorial History, Louisville, J. S. Johnston, 1896, Vol. I, p. 248.
⁶⁶ Report Ky. Inspt. of Mines, 1893, p. 156.

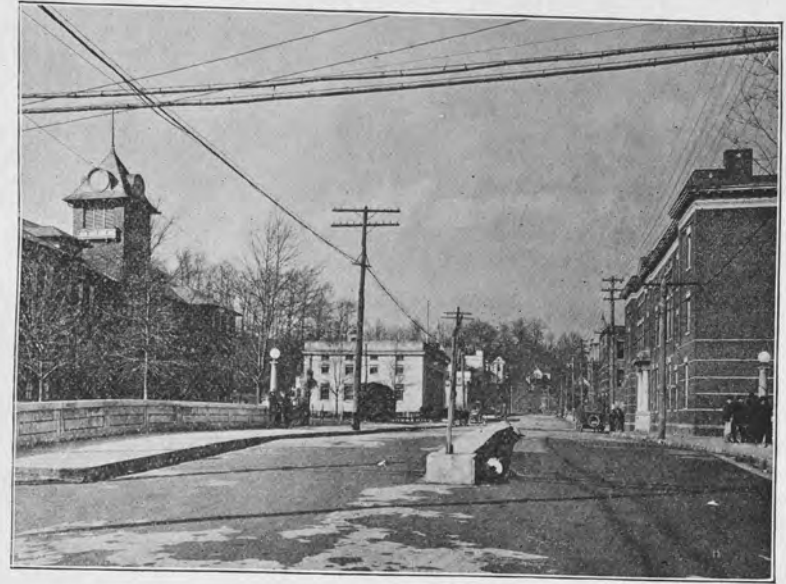
STATISTICS SHOWING DEVELOPMENT OF THE COAL INDUSTRY IN KENTUCKY (1885-1918)

Year.	Total Production in Short Tons.	Per Cent Mined by Machines.	Production of Coke in Short Tons.	Tons Produced Per Death.	Counties Producing Commercial Coal for First Time.	First Three Leading Counties in Coal Production.	Number of People Involved.	Remarks
1885	1,600,000						Small strikes.	Strikes at Central City caused by introducing convict labor.
1886	1,550,000		4,000			Hopkins, Whitley, Ohio.	Strike at Jellico mines, lasted 3 months. Miners wanted a check weighman.	
1887	1,933,185		9,054	170,350		Hopkins, Ohio, Laurel.		
1888	2,576,000		9,340	172,789		Hopkins, Ohio, Whitley.		
1889	2,389,755					Hopkins, Whitley, Ohio.		
1890	2,701,496		20,710	230,230				
1891	2,916,069		32,693	184,383				
1892	3,025,303		36,860	378,412				
1893	3,007,179	20	46,147	275,187	There were 28 counties producing commercial coal at this time.			
1894	3,111,192		27,715	295,719		Hopkins, Whitley, Ohio.		
1895	3,357,770	26	25,458	400,971		Hopkins, Whitley, Ohio.		
1896	3,333,478	30	27,168	530,418		Hopkins, Whitley, Ohio.		
1897	3,602,097	41	32,264	275,338		Hopkins, Ohio, Laurel.		
1898	3,887,908	43	21,398	590,355		Hopkins, Ohio, Whitley.		
1899	4,607,255	42	55,580	643,634		Hopkins, Whitley, Ohio.		

STATISTICS SHOWING DEVELOPMENT OF THE COAL INDUSTRY IN KENTUCKY (1885-1918)—Continued.

Year.	Total Production In Short Tons.	Per Cent Mined by Machines.	Production of Coke in Short Tons.	Tons Produced Per Death.	Counties Producing Commercial Coal for First Time.	First Three Leading Counties in Coal Production.	Strikes and Number of People Involved.	Remarks
1900	5,328,984	45	72,975	295,334		Hopkins, Whitley, Ohio.		
1901	5,468,986		97,762	253,558	Johnson Morgan.	Hopkins, Whitley, Muhlenberg.	Strike in western district in March, April and May. Resulted in raise of wages. No strikes noted by mine inspector. There were a lot of agreements made.	
1902	6,766,384	45.6	126,559	338,390		Hopkins, Whitley, Muhlenberg.	No strikes of importance, resolutions were made between operators and employees.	
1903	7,538,032	49	119,559	287,930		Hopkins, Muhlenberg, Whitley.	No strikes reported by mine inspector. Resolutions were drawn up whereby disagreements are settled by a board.	
1904	7,576,432	52	62,722	377,227	Pike.	Hopkins, Muhlenberg.		
1905	8,432,523	55	65,475	259,330		Hopkins, Muhlenberg, Bell.		
1906	9,653,647	53	61,521	282,309	Floyd.	Hopkins, Muhlenberg, Bell.		
1907	10,753,124	53	48,398	372,716		Hopkins, Muhlenberg, Bell.		
1908	10,246,533		38,353	245,119		Muhlenberg, Hopkins, Bell.		
1909	10,697,384	58	38,849	302,828		Muhlenberg, Hopkins, Bell.		
1910	14,623,319		44,543	175,238	Wayne.	Muhlenberg, Hopkins, Bell.		
1911	14,043,703	63	60,071	316,473	Harlan.	Muhlenberg, Hopkins, Bell.		
1912	16,490,521		191,555	322,527	McCreary, Letcher, Perry.	Hopkins, Muhlenberg, Bell.	The inspector made no report of strikes during this period.	
1913	19,616,600		317,084	406,670		Muhlenberg, Hopkins, Bell.		
1914	20,382,763	73	448,959	330,625		Pike, Hopkins, Bell.		
1915	21,361,674		526,097	337,677	Jackson.	Pike, Letcher, Hopkins, Pike, Letcher, Hopkins, Pike, Letcher, Muhlenberg, Pike, Muhlenberg, Letcher.		
1916	25,393,997		802,526			Hopkins, Pike, Letcher, Muhlenberg, Pike, Muhlenberg, Letcher.		
1917	27,809,976		863,071			Pike, Muhlenberg, Letcher.		
1918	31,530,442		818,785			Pike, Muhlenberg, Letcher.		The small number tons per death is due to 3 explosions killing 50 miners.

The popularizing effect of the Kentucky coal exhibit at the Chicago Exposition was tremendous as a study of the production figures for the state in the accompanying table shows. In the last decade of the old century nearly three million tons were added to Kentucky's production, thereby doubling it. This coal was



MIDDLESBORO—A CITY BUILT BY COAL

One of the finest, healthiest and most picturesque of southeastern Kentucky cities is Middlesboro in Bell County. Coal put it on the map a few decades ago. This is a view of North 20th Street, showing public school and U. S. post office on the left and municipal buildings on the right. Surrounded by high mountains the city affords many unique views, including Cumberland Gap.

shipped through by rail to large and rapidly growing markets in the industrial centers of Ohio, Indiana, Illinois, Wisconsin and Michigan, and laid the basis of the excellent reputation and large demand found for Kentucky coal in those manufacturing portions of the United States today.

A NOTABLE RECORD OF EXPANSION.

Comparisons serve well to illustrate the shifting growth and expansion of the coal industry of Kentucky from the middle '80's when it may be said to have been reborn, down to the pres-

ent year 1923. 1886-87⁶⁷ there were 43 mines operated in the western coal field, 8 in the northeastern coal field and 24 in the southeastern field, a total of 75 for the entire state. In 1920 the total number of mines in Kentucky was 834, or an increase of 1012 per cent. The amount of money put in circulation in 1885⁶⁸ by coal mining was: Western field, \$790,000; eastern field, \$745,000; totaling \$1,535,000. The value of the coal produced in Kentucky in 1920 was \$159,457,380, or 103 times as much as the total of 1885.

The growth of the coal industry is well shown by an examination of the production records of the various coal counties within the state. While the original discovery of coal was made in 1750 in what is now Bell county, it was in the western coal field county of Muhlenberg that the first commercial mine was operated in 1820. Following the lead of Muhlenberg county, the western coal field saw the first commercialization on a large scale, Hopkins, Muhlenberg and Ohio standing at the top of the production list in the order named in 1885.⁶⁹

In 1890, with Hopkins county leading, Whitley (Jellico field) first rose to second place, relegating Ohio to third in rank. Ohio came back to second place in '91 and '92, but in '93 lost it again to Whitley, which was permanently displaced for second rank by Muhlenberg in 1903. In the meantime in 1901, Johnson and Morgan came in as producers in the northeastern field and were followed by the entrance into the productive ranks of Pike in 1904; Floyd in 1906; Wayne in 1910 (produced this year only); Harlan in 1911; McCreary, Letcher and Perry in 1912; and Jackson in 1915. Hopkins continued the productive leadership until 1908, when it was relegated to the second place by Muhlenberg. Bell had risen in 1905 to third place and maintaining it in 1908 carried this position until 1915, when Hopkins displaced it. In 1914 Pike county, which had first produced in 1904, and was considered a virgin coal county, took the lead in production from Muhlenberg, which had held it almost continuously since 1908. Again in 1916 Letcher, which had come into the list of producers in 1912, became the largest producer of coal in Kentucky. In 1919, the latest date for which detailed figures are

⁶⁷ Third Ann. Rept. Ky. Inspt. Mines, 1886. Norwood, p. 5.

⁶⁸ Ann. Rept. Ky. Inspt. Mines, 1884-85.

⁶⁹ Second Ann. Rept. Ky. Mine Insp., 1885, C. J. Norwood, p. 5.

available, Pike county, producing 4,784,899 tons valued at \$11,916,261, as much coal as the entire state produced annually until 1900, took and has since maintained the first rank of the thirty-two counties mining and exporting coal in Kentucky.



HOPKINS COUNTY COAL AWAITING SHIPMENT

Eleven cars loaded with No. 9 coal from the St. Bernard-Arnold mine. The topography is characteristic of this section. The tipple shows in the middle distance.

MANUFACTURE OF COKE.

Coke is now produced in both the eastern and western coal fields of Kentucky. Although the best coking coals are now known to exist in the eastern coal field, and this field now produces the most coke, principally by-product, it was in the western field that the first coke was produced, in the commercial quantity of 4,250 tons from 45 ovens in 1880.⁷⁰ In 1887⁷¹ the Clifton mines in Hopkins county were the only ones producing coke. The first commercial production of coke in the eastern field occurred in 1889. The coke industry grew from 123 ovens in 1889⁷² to 279 in 1892,⁷³ and in 1891 there were 32,693 tons of coke produced.

Up to and including 1900 the coking industry in this state had depended for its existence chiefly upon the utilization of slack and mine run coal. Stimulated by the active demand for coke in 1889 and 1900 the production increased to 95,532 tons,

⁷⁰ Min. Res. U. S. G. S., 1900, p. 497.

⁷¹ Rept. Ky. Inspt. Mines, 1892, p. 61.

⁷² Rept. Ky. Inspt. Mines, 1889, p. 25.

⁷³ Rept. Ky. Inspt. Mines, 1892, p. 4.

valued at \$235,505, or approximately \$2.46 per ton. In 1915 Kentucky, which had entered the by-product coke industry, produced 526,097 tons of coke valued at \$1,129,769. This had grown in 1917 to 863,071⁷⁴ tons of coke valued at \$4,119,263. Of this amount, 531,539 tons valued at \$2,324,948, or considerably more than half, was by-product coke. Among the twenty-two coke producing states, headed by Pennsylvania, Kentucky has risen from 16th place in 1913 to twelfth place on her total coke and fourth place on by-product coke alone in the year 1917.⁷⁵

⁷⁴ Min. Res. U. S. G. S., 1917, p. 1145.

⁷⁵ Min. Res. U. S. G. S., 1917, p. 1158.



CHAPTER IV. COAL MINING METHODS.

Much might be said concerning the various methods used in the production of bituminous and cannel coal in Kentucky. Each of the three principal coal mining methods is employed. Drift mining is practically the only one used in eastern Kentucky, while in western Kentucky, slope and shaft mining are most generally in vogue. Open cut or stripping operations are now, however, growing in number in this part of the state. The reason for the sharp division of mining methods used is found in the topographical contrasts of these two widely separated coal fields. In eastern Kentucky the coal field comprises a portion of the maturely dissected Cumberland plateau. The western Kentucky coal field on the other hand is one of low relief with much valley filling.

The deep entrenchment of the streams in the eastern field has exposed considerable thicknesses of the coal measures. These formations, most of which are coal bearing, vary in physical relief from about 100 feet near the western border of the eastern coal field to 1,500 feet in the Cumberland mountain region. The comparative ease with which the above drainage coals in this plateau region may be produced, coupled with their general excellency and industrial adaptability, has resulted in their extensive development. Though drifting methods are used almost exclusively, some few locally sub-surface coals of known economic value are operated by shaft, but they are the exception to the rule. This method is used with excellent results by the Northeast Coal Company which operates the Miller's Creek (Van Lear) seam at Whitehouse in Johnson county at a depth of 110 feet. The Fidelity Coal Company of Bell county is also using shafting methods with success in mining a stray seam at a depth of forty-one feet. This operation is located four miles north of Middlesboro in the Yellow Creek Valley.

In Laurel county along the L. & N. Railroad in the vicinity of London, some restricted areas of near surface coal have been operated by open cut or strip methods. It is certain that in the future other considerable areas in eastern Kentucky where commercial sub-surface coals are found at no great depth below

drainage will be operated in this manner. It is also certain that at a future day many excellent sub-surface coals will be operated either by slope or by a combination of shaft and slope mining, since many of the coal measures in southeastern Kentucky rest at a very low angle of inclination. The Royal Collieries Company is now operating a slope mine at Offutt, and the Consolidation Coal Company is also operating a slope mine at Van Lear, both in Johnson county.

In opening up a new coal property in eastern Kentucky many problems have had to be solved. A comparatively few areas located close to established mountain towns have offered partial housing and amusement facilities for prospective miners and office employes. In most cases, however, the properties have been isolated, and the first problem following the determination of the volume and the value of the coals themselves from actual survey, has been to provide suitable housing for the number of men necessary to produce the required tonnage.



A UNIT COAL MINE AND TOWN

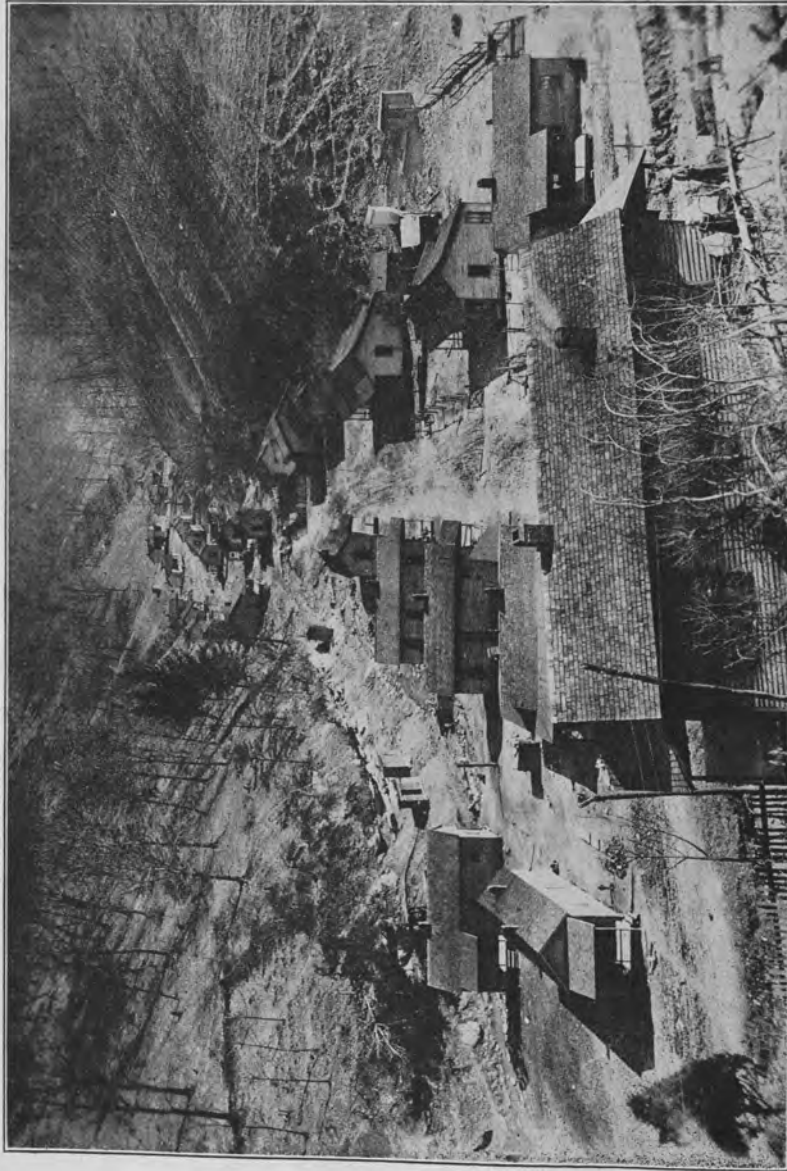
This excellent property is located a short distance above Harlan on Martin's Fork of the Clover Fork of the Cumberland River. Harlan County coal has built a fine reputation during the last few years and this mine, owned by the Wallins Creek Coal Corporation, is profiting thereby.

The layout of a new mining camp from a practical standpoint has generally been dependent upon the type of organization which has come into the field, the thickness of the coal proposed to operate, and the area to be developed. Where these factors have been of sufficient size to warrant it, excellent operations laid out according to the best mining and sanitary practice have been installed. Such operations are to be found at Jenkins, McRoberts and Fleming, in Letcher county, and at Wayland, Wheelwright and Weeksbury, in Floyd, and at Benham and Lynch in Harlan county. In these localities high type camps have been developed with water and sewage systems, amusements, hospital facilities, grade and high schools, and paved streets. Welfare work has been undertaken, and a great deal of stress has been laid on securing the best possible living conditions consistent with efficient coal mining operation.

As contrasted to such splendid mining town equipment, there exists generally throughout the Eastern Coal Field a more haphazard and unsystematized layout of coal operations. In the small camps, houses are poorly constructed with little or no attention paid to their architecture or usefulness. Sanitation is neglected, and an adequate pure water supply is a rare thing. Clean amusements and modern hospital facilities are generally given no thought at all, and the condition of the roads or the schools is left to the county authorities with the result that in most cases neither are provided to serve the mining community.

PLAN OF DEVELOPMENT.

In the development of a coal mining property, an accurate base map is the first essential. This should properly show the topography at the surface or outcrop of the coal seams, and all stream and property lines. If the coal which is to be worked is a slope or shaft proposition, it should be sufficiently cored to allow an adequate interpretation of the thickness and pitch of the seam, and a reasonable calculation as to the amount of tonnage available. This information should be laid down on the property map so as to allow an accurate determination as to the best point from which to open and operate the coals so as to take



BLUE GRASS COAL CO. CAMP
 This little mining town, located near Hazard, Kentucky, is typical of the housing equipment of the medium sized operators of the eastern coal field.

advantage of the natural drainage in the seam, and with it a down grade haul of the coal. Accessibility to railroad or river front as the case may be will here become a factor.

Having determined the point for the main entry, the operator will now give his attention to the physical conditions of the seam to be mined. He will want to consider character of the coal, its thickness, and the nature of the partings, if any. The character of the roof, whether shale or sandstone, will determine the amount of timber necessary, and the character of the floor of the mine will determine the ease with which tracks and drainage channels may be constructed. At the same time the operator will want to consider the area he wishes to develop immediately, separating it from that which he plans to develop later on.

The rapidity with which development or new entry work is to be carried on in comparison to the continued actual mining out of the coal for shipment is also an important early consideration. General practice has made use of the room and pillar system; the smaller mines employing single entries without air courses. The larger mines, however, make use of what is known as the three entry systems, while the largest mines use a four entry system for all the main entries.

Coincident with the general plan of development, a systematic scheme of ventilation will be installed. It is the good fortune of eastern Kentucky to be practically free from fire damp or mine gas which is such a serious menace in the northeastern portion of the Appalachian field. There are a few mines, however, where some special attention should be given to ventilation in order to avoid possible accumulation of mine gases. Since the mine gases are so rare in eastern Kentucky, the problem of ventilation generally develops into one of simply supplying a sufficient amount of fresh air at the face of the mines to insure efficiency among the miners, and meet the letter of the law.

In olden days the practice of developing a draft by furnace fire was commonly used, but this has now been almost entirely abandoned in favor of the installation of fans of one type or another. These are usually driven by electricity with a special set of gears so as to allow a change of air suction in proportion to the amount of development in the mine. Fan motors with two speeds are also used to advantage, the slow speed being used for

the early stages of development, and full speed being used when development has grown to such an extent as to require it. Frequently when two shifts are worked in the mines a low speed is used at night where a small night force is employed, and the high speed for the day shift when the mines are working full. The placement of the ventilating fan is one of importance, and practice indicates that it should be kept clear of obstructions and free to respond to excess pressure which might be induced by explosions.



A COAL CAMP SCHOOL

This little two-room graded school is located on the property of the Storm King Coal Co., a large operator of the Hazard field. It is a typical school of its kind.

MINING THE COAL.

As has already been indicated the old time methods of undercutting the coal by hand picks and then shooting it down, as well as that of shooting it from the solid, have been replaced during recent years by modern methods of undercutting the coal with electrically driven chain machines. There are still, however, many mines in eastern Kentucky where hand picking is in vogue, and many more where puncher machines, the first advancement over the slow by-hand methods, are still used. The older primitive methods of mining still persist, though the chain undercutting machine is far superior from every standpoint to any other method yet devised. There are three types of cutters

generally in use. These are the short wall, the long wall and the center or overcutting. Of these, the first is probably the most important. But as the necessity for opening and developing seams of coal containing one or more partings increases, the long wall and overcutting machines are coming into demand.

The center or over-cutting machine is also of special advantage in cutting out partings as well as in the matter of taking out the separate benches of coal where varying kinds of coal occur within a single seam. In some parts of Floyd county where, as on Right Beaver creek, there is a considerable cannel coal division of the main seam operated, the over-cutting machine is of great value in making the separation. The undercutting is done to a depth of 5 and 10 feet, usually the cut extending about six feet from the base. These undercut machines have been thoroughly standardized and to such an extent that they may be depended upon for continuous and fatiguing service.

When the coal has been shot down from the face, the operator is next confronted with the problem of loading into the mine cars. Formerly in eastern Kentucky coal was loaded by hand. This practice is now generally in vogue in most of the operations, but some of the larger and more up-to-date operations have for some little time been making use of mechanical loaders. When it is taken into consideration that about between 30% and 50% of the cost of mining the coal is paid for loading the car in the mine, it will be seen that this matter is one of fundamental concern, especially during periods of the depressed market. Mechanical loaders, while on the market, have not been developed to the same point of efficiency that has marked the development of other coal mining machinery.

While the methods of mining coal at the face have undergone a great change, the development of the system of hauling it to the tibble has kept pace. Though many mines in eastern Kentucky still make use of the mule, others have gradually advanced through the introduction of tail and endless rope haulage, compressed air locomotives, and electric locomotives. In the most modern plants small gathering locomotives are now used to bring the coal to larger train locomotives, which gathering up the coal for several divisions of the mine take it out in a long



CUTTING MACHINE, SHAMROCK MINE
 A typical operating view at the face of one of the largest coal mines in the Providence, Ky., field. The coal is the No. 11 which shows a clay bottom, a limestone roof, and a two-inch shale parting. The thickness of this seam here is 6 feet at a point $\frac{3}{4}$ mile from the main entry.

train unit. In some mines storage batteries are now being used for gathering purposes, and mark a still further advance in the development of electrical power for bringing coal to the surface. As a matter of fact the storage battery locomotive is not competent for large loads, but it finds a marked utility for light loads in temporary openings and workings at the face where it is not practical nor economical to install electrical transmission. In some few mines the combination storage battery trolley locomotive finds special adaptation and is being used to much advantage.

Necessarily the change from light to heavy electrical coal mining machinery and the development of a corresponding high rate of speed in haulage have resulted in a similar change in the character of the track laid. Some years ago under the old methods only a very light track of from 10 to 12 or 16 pound rails was required now trackage weighing up from 20 to 60 pounds is generally in use in order to reduce to within a reasonable figure the cost of hauling the coal. At the same time steel frogs manufactured with switches and switch stands have come to displace the handmade frogs and switches so generally used a few years ago.

HANDLING THE COAL.

The standardization of heavy track equipment has induced a parallel standardization of the larger and heavier mine car. With several types of standard mine car on the market, it is now generally regarded as important to use the type of mine car best adapted to the particular mining practices followed within the region in which the prospective mine is located. This matter, however, is subject to some separate determination based on the height of the coal and the tonnage capacity desired from the mine. The dimensions of the car and wheels as well as the style of the body and material of which it is to be constructed is also to be determined by the mining methods to be employed.

Generally it may be stated that the use of modern mining cars even to the extent of roller bearing equipment has now become quite general, and is considered an important economic mining practice. All steel cars and those with combination wooden bottoms and steel sides are gaining in popularity. These are regarded as thoroughly efficient in dry and semi-dry

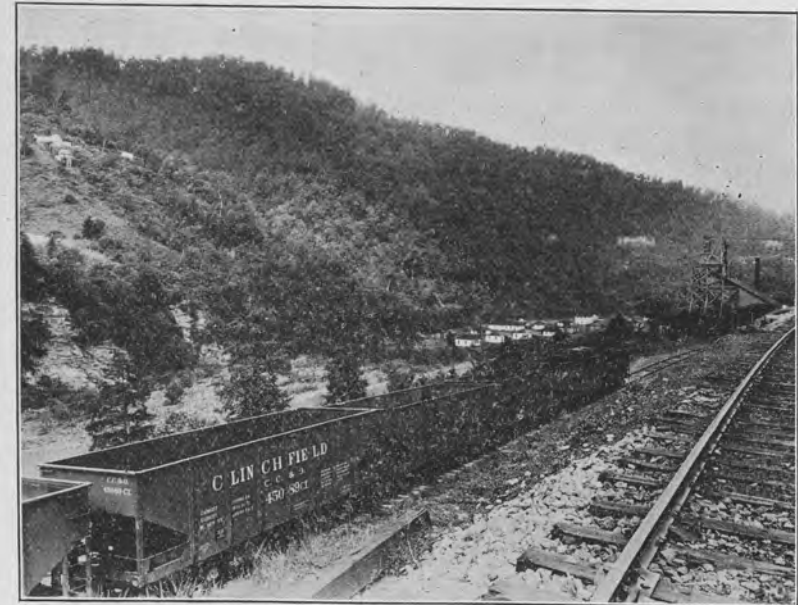
mines. Factors of determinative importance in selecting the type of mine car involve: (1) The capacity of the car desired, (2) the gauge of the track, (3) the desired speed and related size of wheel, (4) the thickness of the coal and size of the entries, (5) methods to be used in unloading, (6) methods to be used in hauling, and (7) amount of money available for mine equipment.

In many mines the problems attendant on the weighing and unloading of the coal have become serious ones. This is especially true in cases where it has become desirable to increase the production. The development of modern weighing and unloading equipment, however, has made it possible for one or two skilled men with about 10 or 15% of the manual labor formerly required to unload from 1,000 to 5,000 tons of coal in a working day of 8 hours, with the possible addition, under certain conditions, of two or three extra labor hands. Formerly it required four to six men to weigh and unload a small production of from 1,000 to 1,500 tons. In this particular alone, modern methods and equipment have made a very great contribution to efficiency and its correlative increased production.

Modern practice makes use of some style of trip control feeder, which, coupled with an automatic recording scale for weighing and a rotary dump for unloading, secures a high loading capacity at a minimum cost. The use of this system obviates the necessity of employing power to prepare the cars for weighing and unloading after they have been released from the motor. The best method of handling the coal at the weighing and unloading points has become a matter of much concern in the attempt to reduce costs. Results secured today in many modern mines indicate that much money may be saved to the average coal operator by giving attention to the operating leakage which may be found at these points.

At the present time the best handling and unloading practice involves the dumping of the coal so as to pass it to the feeder, from whence it is passed over a grizzly for the purpose of getting the lumps on the top. In passing them over the inspection table the examination of the contents of each individual car is allowed, and the amount of slate or other impurities with which it may have been loaded may be determined. From this table

the coal passes to the conveyor and thence to the screens in the railroad tippie either by tram or hoist, depending upon the relative position of the seam to that of the railroad.



AN EASTERN KENTUCKY BUCKET LINE TIPPLE

The coal is mined high on the mountain on the left of the railroad and the Big Sandy River. It is brought by a cable line in buckets from the little loading house to the railroad tippie on the right where it is dumped into the cars. This operation, which is located one mile above Elkhorn City, Pike County, Ky., is owned by the Kentucky-Elkhorn Collieries Coal Co.

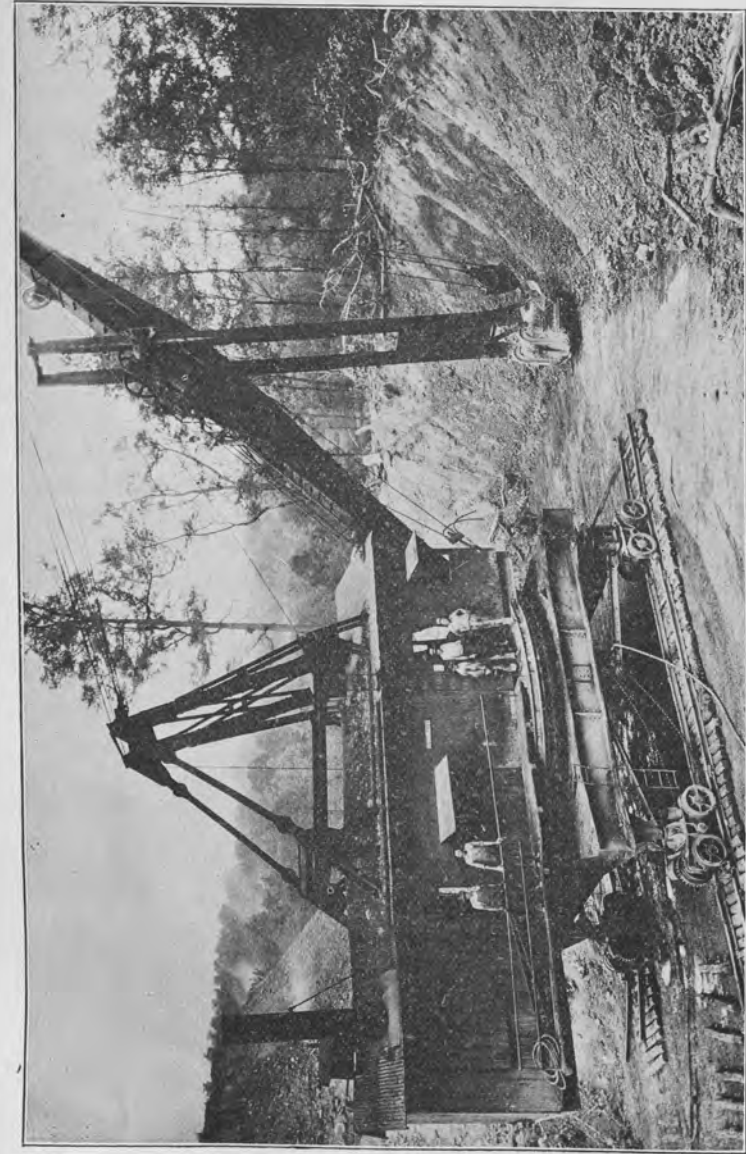
By using shaking screens of different types, picking tables and loading booms, the operator is able to run his grades as follows: (1) Run of mine, (2) lump or block, (3) egg, (4) nut, and (5) slack. Of first importance among the several standard types of screens on the market is the balance shaking screen, one type model of which has pendulum hangers. Equipped with what is known as a horizontal picking table, this type of screen is now used in many operations. Besides these there is also a vertical vibrating type of smaller size, as well as the disc grizzly which is constructed so as to develop a revolving movement.

MINING METHODS.

In slope, shaft, and open cut mining in western Kentucky, quite different methods are used than those which have been described for the ideal drift mine which is the principal type now operated in eastern Kentucky. Slope and shaft mining require special developments of the methods of haulage and drainage. These methods and practices become of increased importance and cost as the development of the property proceeds, and for this reason their correct installation is highly desirable. Large and reliable power equipment for cable haul in the case of the slope mine is a necessity. In a shaft mine a similar power plant with an elevator lift must be provided and continuously maintained. In the western field coal is hauled by rope, electric locomotive and mules, and raised by steam lifts.

The drainage of the shaft and the slope mine becomes of equal importance with that of the general maintenance of the property, for in either slope or shaft mine no surface run out is possible. A system of pumps proportionate to the prospective mine production must be installed with the first shaft or slope operation, and continuously maintained through all labor, equipment and transportation tie-ups, if the mines are to be kept free from disastrous effect resultant from "drowning out."

In the western Kentucky coal field the general practice is to abandon all mine pillars. For this reason the pillars are reduced in size during the mining to the absolute requirement of roof support. This practice which may seem wasteful to the student of coal mining engineering who sees a coal volume loss of about 35% to 40%, and figures a recovery volume of approximately 60% to 65%. From a practical standpoint this low recovery practice has some real advantage at the present. In due time, however, these advantages will disappear and these mines in competition with others in the central interior basin will be forced to forego present day methods and increase measurably the percentage of coal recovered. Generally the mines are so planned as to conform to the local dip of the strata which may vary from the horizontal to 5 degrees and 10 degrees. In dipping strata the rooms are driven up the rise from the upper of the two butting entries. In nearly horizontal beds the rooms are driven from both entries as in eastern Kentucky. Most of the coal is



A ILSLEY STRIPPING SHOVEL. This is one of the large operations of the Western Kentucky coal field. It belongs to the Western Colliers Coal Co. and is here seen removing earth from the No. 9 coal at Ilsley, Kentucky.

undercut with electric chain machines. The older method of shooting from the solid is, however, still in use, and produces annually a considerable tonnage.

In the larger open cut operations in western Kentucky such as those at Ilsley in Hopkins county, where immense aggregate amounts of overburden are removed in the course of systematic mining operations, the close adjustment of the type of excavator used, and the physical requirements of the property determine the amount of hazard involved in this sort of mining operation. As in the drift mine the operator will develop his tippie and power plant at the point most advantageous to rail or water transportation, and will construct dinky tramroads of such character and extension as to allow a free movement of the coal as it is mechanically loaded from the stripped property. Mining coal by the open cut, or the stripping method, is essentially a mechanical engineering problem in which either good or bad engineering practice may mar or make the best of properties. Though at present little, if any, of the coal mined by stripping methods is washed, cleaned and graded on the property, it is only reasonable to believe that as a keener competition develops in the near future, as it undoubtedly will, standard practices involving this phase of preparation of the coal for the market will be developed. At the same time more refined and secure methods of storage on the property and at the points of commercial distribution will be evolved.



CHAPTER V. QUALITIES AND USE.

Though the coals of the Eastern and Western Coal Fields of Kentucky are all of Pennsylvanian age, subdivisions having been made in each of these fields into the Pottsville, Allegheny and Conemaugh formations. The qualities of the eastern coals are quite different from those of the western. During the period of deposition differing conditions of sedimentation which are not yet thoroughly understood, were in effect. These conditions produced regional eastern and western coals which are quite dissimilar in every important commercial characteristic. Southeastern Kentucky coals are the high grade coals of the state, low in sulphur, low in ash, and high in volatile combustible matter. Many of these coals show a block or splint characteristic. Western Kentucky coals range much higher in ash, sulphur and moisture, with a corresponding decrease in volatile combustible matter; and besides are much softer.

The eastern Kentucky coals have recently been divided¹ into two districts based on their sulphur content. The low sulphur coal producing counties border the Pine and Cumberland mountains. Many of these counties show less than .75% sulphur, and all of them less than 1%, commercial coals only being considered. The counties making up the western border of the eastern coal field range much higher in sulphur varying from slightly more than 1% to almost 3%; this group of counties extends from the Ohio river to the Tennessee line. All of the commercial coals produced in western Kentucky range much higher in sulphur than do any of the eastern Kentucky coals, the lowest county average in western Kentucky being 3.22% for Henderson county. Individual coals for this section of the state may run much higher in sulphur content. This is also true for other states. In a recent publication of the United States Bureau of Mines* the following table was presented:

¹Jillson, W. R., The Low Sulphur Coals of Kentucky. Bul. 1152, A. I. M. M. E. 1919; also Dept. of Geol. & Forestry of Ky., Bul. IV, pp. 70-74, 1 map, 1920.

*Powell, A. R., Analysis of Sulphur Forms in Coal. U. S. Bureau of Mines, Tech. Paper 254, p. 12, 1921.

Coal Samples		Total	Pyritic	Sulphate	Organic
Laboratory number	Source (State)				
23066	Pennsylvania	1.21	0.47	0.07	0.67
18847	do	1.72	.79	.23	.70
20507	West Virginia	.56	.08	.01	.47
21308	Kentucky	.71	.13	.04	.54
21100	Tennessee	4.25	1.75	.71	1.79
27224	Kansas	3.06	1.99	.32	.75

¹ Values given in per cents, air-dry basis.

Although the geographical position of a coal field is an important factor in determining its logical markets, in the case of Kentucky it can be truthfully said that qualitative features of the coals themselves have been the real underlying cause. This statement is particularly in point with respect to the by-products coking coal field of southeastern Kentucky, which during the last five years has had the most rapid development of any major coal field in the United States. A representative analysis of the well known Elkhorn coal of this region is given herewith.

ANAYLSIS ELKHORN COAL.

Laboratory No. G-4096.—Coal, received April 24, 1923, from Dr. W. R. Jillson, State Geologist, labeled "Specimen: Channel Sample Elkhorn Coal. Locality: Mine No. 201, Consolidation Coal Co., Burdine, Letcher county, Ky. Collector: W. R. Jillson, State Geologist. Date: March 21, 1923." Sample, about 5 pounds of clean, bright coal in cotton sack.

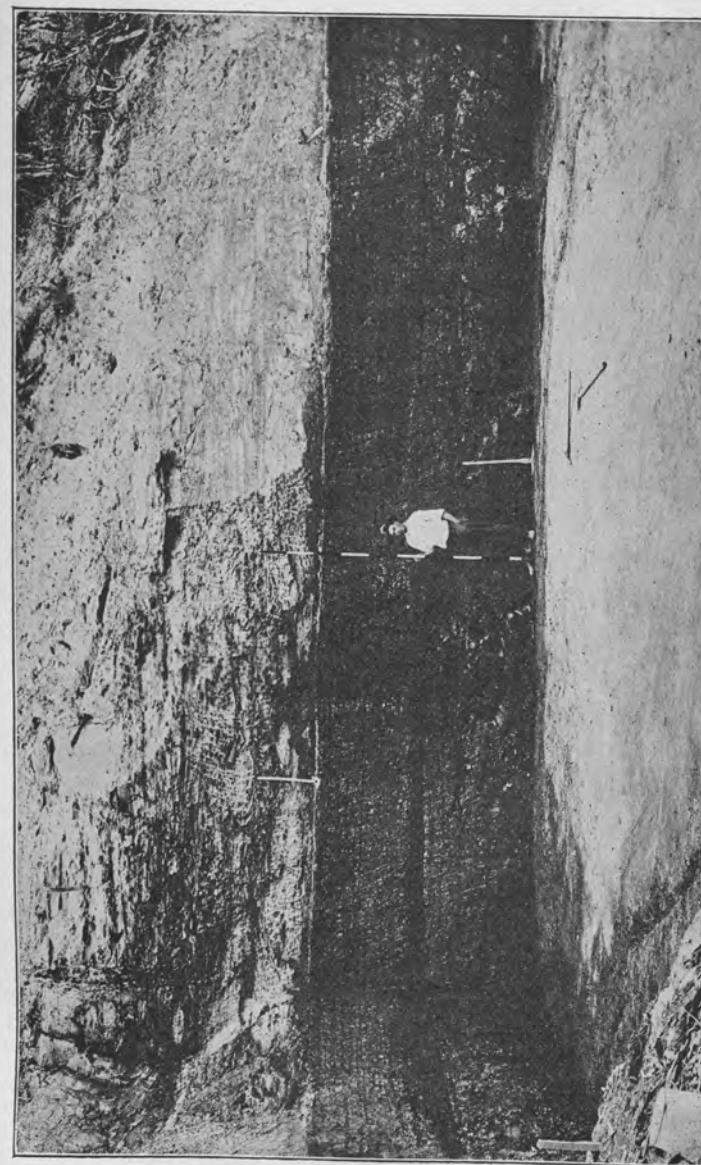
Analysis of air-dried sample.	Per cent.
Moisture	1.58
Volatile combustible matter	30.78
Fixed carbon	64.24
Buff-gray colored ash	3.40
<hr/>	
Total.....	100.00
Sulfur	0.47
B. T. U. per pound	13,740.

(Analysis by W. D. Iler.)

ALFRED M. PETER, Chief Chemist.

Lexington, Ky., April 27, 1923.

As a generality the several coals of the western coal field are used for steam making by industrial and transportation corporations. The coals of eastern Kentucky, on the other hand, find



THE ELKHORN COAL

This view shows an open facing back of the outcrop made by the Consolidation Coal Co. in the course of the development of its properties in Letcher County. The Elkhorn coal field is confined entirely to southeastern Kentucky.

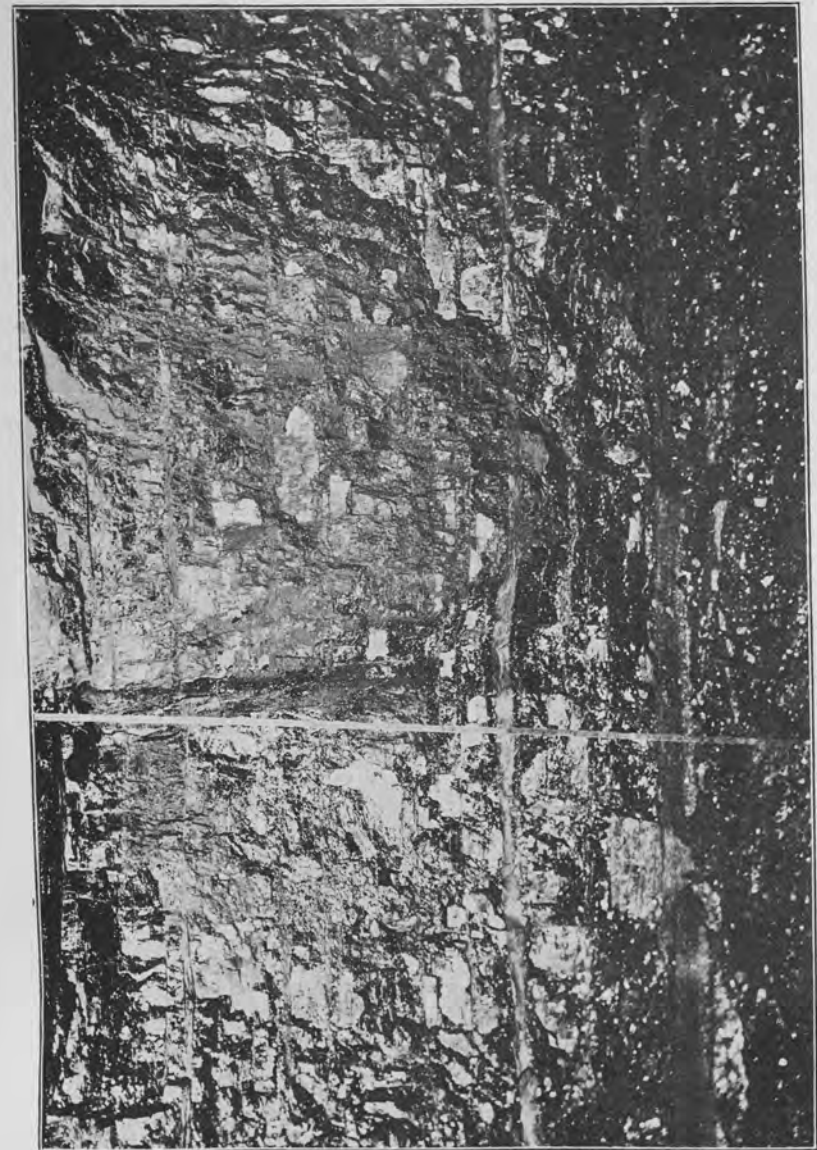
their most important demand comes from producers of by-product coke and illuminating gas, and from domestic consumers. The western Kentucky coals are chiefly consumed as railroad fuel in the middle Mississippi valley while the eastern Kentucky coals are but slightly used for this purpose. In both eastern and western Kentucky a growing tonnage is yearly being produced for domestic consumption in heating and cooking. In northeastern Kentucky, where some of the best block or splint coals are found, the volume diverted to domestic consumption amounts to 10% or 15% and is rapidly increasing. A large portion of this market is outside of the state. Compared to Ohio, Pennsylvania and other industrial coal producing states, Kentucky uses but a very small fraction of her coal production for the purposes of manufacturing within the state. In 1917 by-product ovens used about 9,713,000 tons of Kentucky coal. About 300,000 tons were used in the same year in bee hive ovens.

COMPARISON OF THE COALS.

The coals of the eastern Kentucky coal field being particularly well suited to the manufacture of by-product coke enjoy a merited reputation and widening market. When used for this purpose they are generally mixed with some proper proportion of low volatile coal. In 1917 it was indicated by the United States Fuel Administration¹ that 87% of the coal production of northeastern Kentucky, 52% of that of the Hazard district, and 44% of southwestern Kentucky was suitable for the making of by-product coke. A review of the output of the mines of these three districts shows that northeastern Kentucky produced in 1917, 5,389,454 tons of first grade coking coal; the Hazard district 878,009 tons, and southeastern Kentucky about 1,750,000 tons. Besides this a considerable tonnage of second grade coking coal was produced in these districts.

Western Kentucky at the same time produced 293,539 tons of first grade coking coal. It is a fact that the demand for by-product coking coal has been to a very considerable degree responsible for the rapid growth in the development of the eastern Kentucky coal field. In this part of the state expansion of the coal producing equipment has far exceeded that of the trans-

¹ Analyses of Kentucky Coals. U. S. Bureau of Mines, Technical Paper 308, p. 12, 1922.



A SIX FOOT FACE OF NO. 11 COAL.
This facing is in the Reinecke Coal Mining Company's mine at a depth of 265 feet. The view shows a two inch shale parting, a slate top and fire clay bottom. This coal is one of the most important industrial coals of Kentucky.

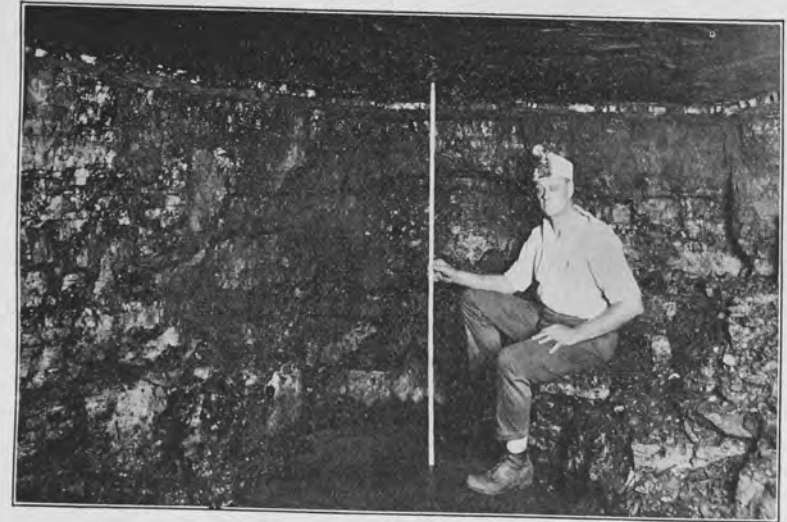
portation facilities which not infrequently results in slow deliveries on the part of the shipper. Taking the state as a whole in the year 1918, gas and electric public utilities corporations used the following proportions of the total volume of coal produced: Northeastern, 14.7%; southeastern, 10.4%; Hazard, 6.7% and western, 12.4%.

EASTERN KENTUCKY COALS.

Since the coals of eastern Kentucky now come into direct competition with those of southwest Pennsylvania, Ohio, Maryland and West Virginia, and have taken markets which formerly belonged to these adjacent coal producing states, it is perhaps well worth while to consider the factors which have been instrumental in bringing this about. It is now generally recognized that the coal consuming public has learned to appreciate the superior qualities of coals produced in eastern Kentucky. Many consumers of high volatile coals for by-product coking and gas making purposes now buy their tonnage in this region under extended contract; while others, such as the Ford Motor Company, of Detroit, Michigan, which has entered the Pond Creek section of Pike county, Kentucky, have gone directly into the field and taken up large undeveloped acreage to produce their own requirements.

The best coals of eastern Kentucky are found in Harlan, Letcher, Pike, Leslie, Floyd, Knott and Perry counties. The separate commercial seams are known as the Elkhorn, Harlan, High Splint, Freeburn, Alma, Thacker, Benham, Hazard, Fire, Clay and Van Lear coals. The general superiority of the several coals of this group is indicated by the fact that while 14,000 and 15,000 B. T. U. is not at all uncommon, individual coals, such as the lower Elkhorn at Hellier in Pike county, have been analyzed by standard methods and show as high as 15,330 B. T. U. with 65.7% of fixed carbon, and only .6% sulphur. A comparison of a representative number of Kentucky, West Virginia and Pennsylvania high volatile coking coals has recently been made. Samples were taken from operating mines and outcrop openings. The result of this comparison shows plainly that the southeastern Kentucky coals are lower in ash, lower in sulphur, about the same in phosphorous, about the same in by-product yield per net

ton of tar (in gallons), about the same in free benzol, an increase of 2 to 5 lbs. per ton in ammonium sulphate, about the same



FACE OF HAZARD (NO. 6) COAL

This coal has many superior features and enjoys a wide reputation. It is generally about five or six feet thick. It is here faced on the property of the Storm King Coal Co. in Perry County, Kentucky.

cubic footage of surplus gas, about the same yield of coke, and an intermediary high fusing point of ash. These tables are given herewith.¹

COMPARATIVE ANALYSES, KENTUCKY, WEST VIRGINIA AND PENNSYLVANIA HIGH VOLATILE COKING COALS.

KENTUCKY COALS. (High Volatile Group.)

	Average	Maximum	Minimum
No. of Samples, 24			
Ash	4.78	9.32	1.56
Sulphur	0.75	1.78	0.44
Phosphorous	0.006	0.027	0.001
By-product yield per net ton:			
Tar—Gallons	7.8	10.2	5.4
Benzol, free	2.6	3.2	2.3
Ammonium Sulphate: Lbs. 2.5.....	28.1	34.1	22.4
Surplus Gas: Cu. ft.	5068	5520	4740
Yield Coke: %	69.5	75.0	67.0
Fusing Point—Ash	2654°	2940°	2430°

¹Eavenson, Howard N. "Some Peculiar Values of Eastern Kentucky Coals and the Proper Methods to Realize on Them," Manuscript presented before the Kentucky Mining Institute, October 7th and 8th, 1921, Lexington, Kentucky.

WEST VIRGINIA COALS.
(High Volatile Group.)

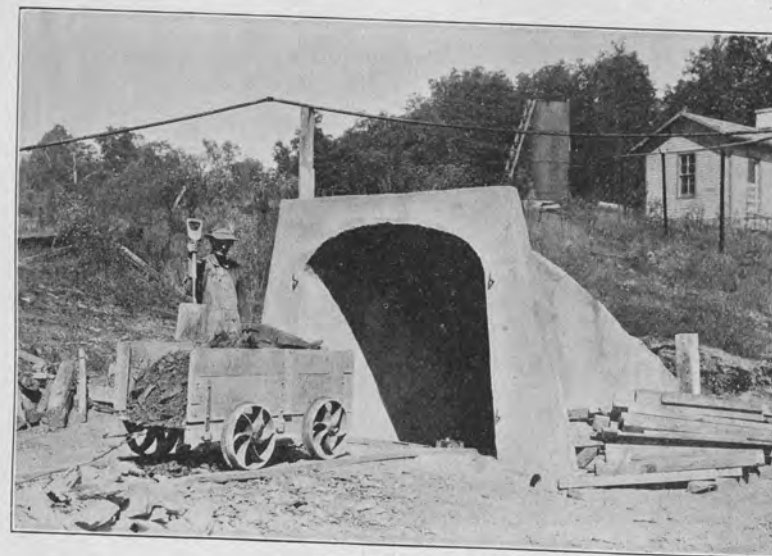
	Average	Maximum	Minimum
No. of Samples, 31			
Ash	5.29	9.09	2.59
Sulphur	0.99	2.76	0.63
Phosphorous	0.006	0.019	0.002
By-product yield per net ton:			
Tar—Gallons	8.0	10.6	5.8
Benzol, free—Gallons	2.6	3.3	2.1
Ammonium Sulphate—Lbs.	24.5	31.0	21.2
Surplus Gas—Cu. ft.	5069	5340	4770
Yield Coke %	72.8	76.8	68.2
Fusing point—Ash	2743°	2970°	2610°

PENNSYLVANIA COALS.
(High Volatile Group.)

	Average	Maximum	Minimum
No. of Samples, 20			
Ash	7.27	10.44	5.32
Sulphur	1.18	2.14	0.77
Phosphorous	0.012	0.018	0.005
By-product yield per net ton:			
Tar—Gallons	7.8	10.1	5.8
Benzol—Gallons	2.2		
Ammonium Sulphate—Lbs.	25.1	29.8	22.8
Surplus Gas—Cu. ft.	5497	5654	5304
Yield Coke—%	67.5	70.0	64.2
Fusing point—Ash	2366°	2390°	2350°

A study of these tables of analyses reveals the fact that coals from Kentucky rank first in ash, second in fusing point, first in phosphorus, second in tar, first in ammonium sulphate, first in benzol yield, second in gas, and second in coke; and thereby clearly outrank coals produced in the other adjacent competitive regions. Such being the case, freight rates might be looked upon to determine the acceptability of the Kentucky coals. In spite of the fact that Pennsylvania and some West Virginia coals are closer to their markets than are the Kentucky coals, the higher transportation-charge has not militated against the increased use of the coals produced in the eastern part of this state.

It has been shown² that the value of eastern Kentucky coals for by-product purposes ranks in the following order: (1) East-



A SPECIAL ENTRY

This entrance of the Providence Mining Co. is used to let men and mules into the mine. It is also used for the removal of slate and mine rubbish.

ern Kentucky \$2.54 per ton, (2) West Virginia \$2.67, and (3) Pennsylvania \$2.88. In making this economic comparison, certain industrially important physical and compositional characteristics of the coals of eastern Kentucky were not considered. These may be stated as (1) low sulphur and phosphorous contents, (2) high ash fusion point, and (3) block or splint characteristic. There is evidence that as the Kentucky coals are used in direct competition with the coals produced to the northeast, industrial consumers are finding a preference for the Kentucky coals, despite their somewhat greater cost, for the following reasons: (1) The low sulphur and phosphorous content insures longer life for steam and coke making plants; (2) the high ash fusion point enables a much more economical operating cost since it avoids clinkering, and (3) splint hard lump coals deliver in better shape producing less slack for both industrial and domestic consumer.

² Ibid.

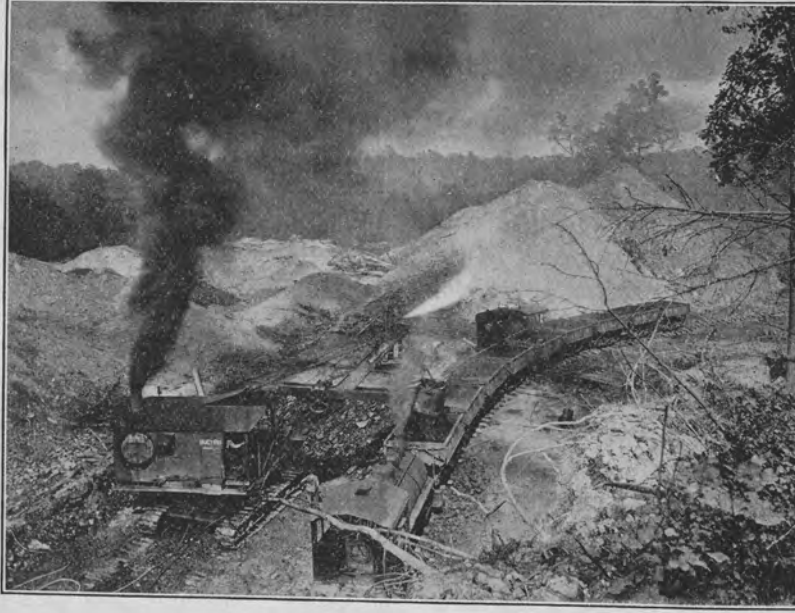
CHAPTER VI.

ANALYSES OF MINE SAMPLES.

There are given herewith representative analyses from each of the coal producing counties in Kentucky. No attempt has been made to show all of the commercial coals of the state as this would produce a very long and tedious list. A part of the analyses here presented were made by the United States Bureau of Mines¹ but the most of them were prepared by the Kentucky Geological Survey. The exact source of the analysis has been given in each case.

For further inquiry the reader is directed to the following reports of the Kentucky Geological Survey: (1) Chemical Analyses, part 1, 1890; (2) Coals of the Licking Valley Region, Bull. 19, 1910; (3) Coals of the Three Forks of the Kentucky River, Bull. 11, 1910; (4) Progress of the Survey, 1908 and 1909, published in 1910; (5) Coals of Quicksand Creek and its Tributaries, Bull. 18, Serial 25, 1912; (6) Coal Field Adjacent to Pineville Gap, in Bell and Knox Counties, Bull. 14, Serial 17, 1912; (7) Upper Cumberland Coal Field, Poor and Clover Forks in Harlan and Letcher Counties, Bull. 13, Serial 13, 1912; (8) Coals of the Tradewater River Region, Bull. 17, 1912; (9) Central City, Madisonville, Calhoun and Newburg Quadrangles, Bull. 19, Serial 26, 1912; (10) Kentucky Geological Survey Report, 4 series, vol. 1, pt. 1, pt. 2, 1913; (11) Coals of Letcher County, 4 series, vol. 4, pt. 1, 1916; (12) Coals of Goose Creek and its Tributaries, Clay County, 4 series, vol. 4, pt. 3, 1918; (13) Coals of the North Fork of the Kentucky River in Perry and portions of Breathitt and Knott Counties, 4 series, vol. 3, pt. 3, 1918; (14) Coals of the Middle Fork of the Kentucky River, 4 series, vol. 5, pt. 1, 1918; (15) Coals and Structure of Magoffin County, 4 series, vol. 5, pt. 2, 1919; (16) Geology of Kentucky, 5 series, Bull. 2, 1919; (17) Geology and Coals of

¹Analyses of Kentucky coals, H. Foster Bain and others, U. S. Bureau of Mines, Tech. Paper 308, 1922.



MINING COAL WITH A STEAM SHOVEL

A stripping operation of the Western Collieries Coal Co., on the former Tradewater Coal Co. property at Hlsley, Hopkins County, Kentucky, showing steam shovel loading coal. In the left foreground the caterpillar tracks show where the coal has been operated. The company owns 500 acres.

Stinking Creek, Knox County, Kentucky, 5 series, Bull III, 1919; (18) Geology and Coals of Webster County, Kentucky, 6 series, vol. 5, 1922; (19) Geology and Coals of the Middle Fork of the Kentucky River, near Buckhorn, in Perry and Breathitt Counties, Kentucky, 6 series, vol. 6, 1921.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Alr-drying Loss	Calorific Value		Softening Temperature ⁴ (° F.)	Authority ⁵ and Year	
	Lab. No.	Kind ¹	Moisture	Volatle Matter	Fixed Carbon	Ash	Subpur	Hydrogen	Carbon	Nitrogen		Oxygen	Calo-ries			British Thermal Units
BELL COUNTY	21557	A	3.0	38.9	56.0	2.1	1.1					1.1	7,961	14,330	2,100	Bureau of Mines, 1918.
	21561	A	3.0	37.8	56.3	2.9	1.0	5.7	79.4	2.0	9.0	1.1	7,889	14,200		Do.
	81286	A	3.4	38.2	56.9	1.5	.8	1.0	5.5	81.8	2.0	6.7	8,133	14,640		Do.
Balkan or Black Mountain mine, Creech bed (face of 10 right entry, 1 main entry, 4,500 feet southeast of mine mouth).	81268	A	3.2	37.9	57.1	1.8	.9	5.9	79.6	2.0	9.8	2.0	7,928	14,270	2,070	Bureau of Mines.
		2		39.2	59.0	1.8	.9	5.7	82.2	2.1	7.3		8,189	14,740		Do.
		3		39.9	60.1		1.0	5.8	83.7	2.1	7.4		8,344	15,020		Do.
	81399	A	1.7	37.6	57.0	3.7	.7					.6	7,861	14,150	2,510	Do.

¹ The kind of sample is denoted by letter as follows: A, mine sample collected by an inspector of the Bureau of Mines; B, mine sample collected by a geologist of the United States Geological Survey; D, mine or car samples not collected by A or B.

² The form of analysis is denoted by number as follows: 1, sample as received; 2, dried at a temperature of 105° C.; 3, moisture and ash free; 4, air-dried condition.

³ Calorific values by the Kentucky Geological Survey, marked *, were made in a Parr peroxide calorimeter; all others were made in an oxygen-bomb calorimeter.

⁴ Softening temperature denotes the temperature, ° F., at which a cone of the coal ash will fuse down to a spherical lump when heated in the furnace.

⁵ All analyses marked Bureau of Mines and U. S. G. S. were analyzed by the bureau's standard methods; all others were analyzed by methods closely approximating these methods in the laboratory of the Kentucky Geological Survey. The year refers to the date when the analyses were originally published; analyses without date are published for the first time.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Lab. No.	Sample Kind	Sample Condition	Proximate				Ultimate				Calorific Value		Sulfuric Temperature (° F.)	Authority and Year			
			Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	Air-drying Loss			Calo-ries	British Thermal Units	
																	Air-drying Loss		Calorific Value
BELL COUNTY—Continued.																	
S1402	A	1	2.5	36.5	56.7	4.3	1.1						1.1	7,761	13,970	2,580	Bureau of Mines,
Same (on rib near face of 5 left air course, 3 main entry).																	
S1406	A	1	2.6	37.2	55.8	4.4	1.1	5.6	78.4	1.8	8.7	7,777	14,000				Do.
Same (composite of samples S1399 to S1405, inclusive).																	
S1407	A	3	38.2	57.3	4.5	1.1	5.4	80.5	1.9	6.6							Do.
Cardinal; Cardinal mine, Harlan bed (face of 6 right air course).																	
S1409	A	1	1.9	38.5	56.4	3.2	1.0	5.7	84.3	1.9	6.9	8,367	15,060				Do.
Same (face of 5 right entry).....																	
S1269	A	1	3.1	37.4	56.2	4.3	.9						1.0	7,722	13,900	2,510	Do.
Cary; Cary No. 2 mine, Straight Creek bed (entry), near face of 1 west main entry).																	
S1273	A	1	3.3	39.3	54.7	2.7	.9						2.0	7,839	14,110	2,220	Do.
Same (composite of samples S1269 to S1272, inclusive).																	
21786	A	1	3.2	36.6	53.7	6.5	1.5	5.8	79.6	1.9	9.7	7,911	14,240				Do.
Chenoa, 1 mile southeast of; Chenoa Hignite mine, Lower Hignite bed (face of 6 right entry, 2,000 feet from mine mouth).																	
21781	A	1	4.8	35.9	57.1	2.3	.7						2.7	7,739	13,930	2,390	Do.
2 miles southeast of; Log Mountain No. 1 mine, Mason bed (face of main entry, 1,900 feet from mine mouth).																	
21681	A	1	2.3	38.6	54.4	4.7	1.3						.8	7,844	14,130		Do.
Colmar, 1 mile north of; Armu mine, Mason bed (face of 5 left entry, 3,400 feet from mine mouth).																	
21685	A	1	2.5	38.2	53.8	5.5	1.5	5.5	77.3	2.1	8.1	7,761	13,970				Do.
Same (composite of samples 21681 to 21684, inclusive).																	
21796	A	1	3.7	35.4	53.7	7.2	.9						1.8	7,344	13,220	3,010	Do.
Fourmile, 3 miles southwest of; East Jellico mine, Dean bed (face of 1 right entry, 3 main entry, 700 feet from mine mouth).																	
21799	A	1	3.9	34.6	54.0	7.5	.9	5.5	73.9	1.7	10.5	7,289	13,120				Do.
Same (composite of samples 21796 to 21798, inclusive).																	
21552	A	1	4.0	37.8	56.5	1.7	.9	5.2	76.9	1.8	7.4	7,589	13,660				Do.
Fox Ridge; Fox Ridge mine, Straight Creek bed (face of 12 left entry, 4,600 feet from mine mouth).																	
21556	A	1	3.8	37.7	56.6	1.9	1.0	5.8	79.6	1.9	9.8	7,961	14,330				Do.
Same (composite of samples 21552 to 21555, inclusive).																	
2887	D	4	1.3	39.0	55.0	4.7	1.2	5.5	82.7	2.0	6.7	8,278	14,900				Do.
21617	A	1	3.3	37.0	53.7	6.0	1.1	1.1	5.6	84.4	2.0	6.9	8,445	15,200			Do.
Gravity; Winona mine, Bennets Fork.....																	
21621	A	1	3.4	37.5	54.0	5.1	1.0	5.6	76.5	2.0	9.8	7,617	13,710				Do.
Harrison; Log Mountain No. 52 mine, Poplar Lick bed (face of 7 left entry, 3,200 feet from mine mouth).																	
21547	A	1	4.5	37.1	53.6	4.8	1.2	5.7	83.6	2.2	7.4	8,317	14,970				Do.
Same (composite of samples 21617 to 21620, inclusive).																	
S2067	A	1	2.7	37.9	50.9	8.5	2.8						1.7	7,356	13,240	2,510	Do.
Kettle Island; Pioneer mine, Straight Creek bed (face of 6 left entry, 2,500 feet from mine mouth).																	
S2071	A	1	2.8	36.7	49.9	10.6	2.6	5.3	70.8	1.6	9.1	7,144	12,860				Do.
Logmont; Crystal mine, Poplar Lick bed (rib at face, 1 right main entry, 1,800 feet north 20° west of mine mouth).																	
S1274	A	1	2.4	36.2	55.0	5.4	.7	5.1	72.8	1.7	6.8	7,350	13,230				Do.
Same (composite of samples S2067 to S2070, inclusive).																	
S1279	A	1	2.6	38.0	57.0	2.4	.7						2.8	7,589	13,660	2,120	Do.
Pineville; Arcadia No. 4 mine, Straight Creek bed (face of main entry, 2,200 feet north of mine mouth).																	
S2403	A	1	3.2	37.0	55.9	3.9	.6	5.7	81.8	1.9	7.5	7,683	13,830	2,390			Do.
New Straight Creek mine, Straight Creek bed (face of main entry, 1,000 feet north-west of mine mouth).																	
21622	A	1	3.2	35.3	52.1	9.4	1.2						1.0	7,966	14,340	2,240	Do.
Ralston; Atlas mine, Hignite bed (rib near face of 1 left entry, 8 left entry, 1,900 feet south 10° of mine mouth).																	
Rim; Rim No. 4 mine, Hickory bed (face of 6 right entry, 3,200 feet from mine mouth).																	
													1.3	7,272	13,060	2,020	Do.

Ky. Geological Survey, 1910
Bureau of Mines, 1918.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate			Ultimate				Calorific Value		Softening Temperature (° F.)	Authority and Year				
	Lab. No.	Kind	Condition	Moisture	Volatiles	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen			Oxygen	Air-drying Loss	Calo-ries	British Thermal Units
BELL COUNTY—Continued.																	
Shamrock; Shamrock mine, Sandstone Parting bed (face of north main entry, 4,200 feet south 80° west of mine mouth). Same (composite of samples 82413 to 82416, inclusive).	82413	A	1	2.8	35.2	54.9	7.1	1.0					1.7	7,456	13,420	+2,740	Bureau of Mines, 1918.
Straight Creek; Earler Nos. 2 and 3 mines, Straight Creek bed (face of 4 right entry, 1½ miles from mine mouth).	21567	A	1	2.9	38.3	55.3	3.5	1.2	5.4	75.0	1.9	9.8	1.8	7,478	13,460		Do.
			2	3.1	35.1	54.9	6.9	1.0	5.2	77.4	2.0	7.3		7,717	13,890		Do.
Tejay; Tejay mine, Mason or Creech bed (face of 6 right entry, 2,600 feet from mine mouth). Varilla; Varilla mine, Upper Hance bed (face of 2 main entry, 400 feet from mine mouth).	21776	A	1	2.5	37.6	56.4	3.5	1.1					1.1	7,917	14,250	2,370	Do.
			2	3.4	32.4	59.2	5.0	.6									
Note.—Coals below are in the coal field adjacent to Pineville Gap. Samples are nearly all from outcrops in the banks of streams.																	
Big Clear Creek, Bear Branch of, Lower Hignite bed.	3063	D	4	1.6	33.4	61.5	3.5	.8									Ky. Geological Survey, 1905. Do. Do.
Caney Branch of, at head, Upper Hignite bed.	3071	D	4	2.5	32.2	57.5	7.8	.6									
Little Clear Creek, Polk Branch of (1,020 feet above mouth) Red Spring coal.	3069	D	4	3.4	32.4	59.2	5.0	.6									
BOYD COUNTY																	
Yellow Creek, right fork of Slick Rock Branch of Stony Fork of Poplar Lick bed.	3091	D	2	2.0	33.5	55.3	9.2	2.3									Do.
Buena Vista Furnace; ¼ mile from Furnace Branch of Straight Creek, No. 5 bed.	1279	D	4	6.5	33.9	52.8	6.8	3.8									Ky. Geological Survey, 1890. Do.
			2	36.5	56.4	7.3	4.0										
Bellefont Furnace; 1-3 mile southeast of; drift on Hood's creek, No. 3 bed.	1284	D	4	3.2	29.7	55.1	12.0	1.9									Do.
Catlettsburg; Horse Branch (splint coal), No. 6 bed.	1285	D	4	2.7	36.7	52.6	8.0	1.7									Do.
Coalton; Ashland No. 4 mine (splint coal), No. 7 bed.	1286	D	4	3.3	33.3	57.6	5.8	2.5									Do.
			2	34.4	59.6	6.0	2.6										
Dry Branch, entry No. 4, cross entry, No. 7 bed.	1287	D	4	4.4	31.1	57.9	6.6	2.1								Do.	
Trace Creek, 300 yards from end of No. 4 entry, No. 7 bed.	1288	D	4	4.1	34.2	54.7	7.0	1.9								Do.	
Little Sandy River, Bolt's Fork of East Fork of, No. 11 bed.	1291	D	4	2.6	35.8	46.9	14.7	5.4								Do.	
Princess; Princess mine, No. 7 (Coalton) bed.	3026	D	4	3.3	34.8	53.2	8.7	2.5								Do.	
BREATHITT COUNTY																	
Note.—These are some analyses of samples taken along the North Fork of the Kentucky River and its branches, also along Quicksand Creek.																	
North Fork of the Kentucky River, Joe Little Bank (cannel coal).	3110	D	4	1	62.4	31.5	6.0	1.0									Ky. Geological Survey, 1906. Ky. Geological Survey, 1890. Ky. Geological Survey, 1910.
William Spencer's mine	1714	D	4	3.6	33.6	58.3	4.5	1.4									
Lost Creek, Mill Branch of, Fire Clay bed	2528	D	2	1.4	35.9	52.5	10.2	3.5									Do.
Quicksand Creek, Alfred Little's drift (cannel coal).	1709	D	4	2.1	43.1	43.4	11.4	4.6									Ky. Geological Survey, 1890. Do.
			2	44.0	44.3	11.7	4.7										
Laurel Branch of Hawes Fork of Spring Fork, lower bench of Dean bed.	3516	D	4	2.0	39.3	54.9	3.8	.6								Do.	
Quicksand Creek, Poplar Fork of Hawes Fork of Spring Fork, upper bench Had-dix bed.	3519	D	4	.7	35.7	53.1	10.5	1.5								Ky. Geological Survey, 1912.	

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Calorific Value		Softening Temperature (° F.)	Authority and Year		
	Lab. No.	Kind	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	Air-drying Loss			Calo-ries	Thermal Units
BREATHTH COUNTY—Continued.																
Troublesome Creek, Roberts' bank, upper (bituminous) part.	1702	D	4	3.3	31.4	49.8	12.5	1.0							Ky. Geological Survey, 1890. Do.	
Troublesome Creek, near mouth of, Jackson Well's Bank (dirty outcrop).	1710	D	2	2.8	32.5	51.6	12.9	1.0								
CARTER COUNTY																
Barrett's Creek, ¼ mile from N. Lewis' house (probably No. 2 bed).	1358	D	4	4.2	33.7	51.4	10.7	3.5							Do.	
Grayson, 2 miles east of; Carter farm, Dr. Jones' land (probably No. 3 bed).	1359	D	4	3.0	35.2	49.2	11.6	1.4								
Mount Savage Furnace; Pritchard's bank (Coalton), No. 7 bed.	1348	D	4	5.4	32.7	52.5	9.4	2.4							Do.	
Tygart Creek, Stone coal branch of, No. 1 bed.	1357	D	4	4.6	33.5	51.6	10.3	1.2								
Willard; from main entry, west of Dry Fork, No. 7 bed.	1354	D	4	3.2	35.1	54.1	7.3	2.6							Do.	
			2		36.2	56.2	7.6	2.7								
CLAY COUNTY																
Note.—Coals from the South Fork and its tributaries; outcrop samples.																
Blue-Hole Branch of Red Bird Creek, near the mouth of Bear Wallow, 1½ miles up branch.	3127	D	4	1.2	29.8	65.0	4.0	.8							Ky. Geological Survey, 1905. Do.	
Manchester; 2½ miles south of; on Horse Creek, Garrard mine, Manchester bed.	2648	D	4	1.2	38.1	54.9	5.8	1.8								
FLOYD COUNTY																
Lockart Creek, up Goose Creek, 4½ miles from Manchester, Manchester bed.	2649	D	4	1.5	35.9	54.7	7.9	.9							Ky. Geological Survey, 1910.	
			2		36.5	55.5	8.0	.9								
FLOYD COUNTY																
Note.—Samples from Floyd County coal are all from outcrops, or a short distance within entries, along streams.																
Abbotts Creek, branch of	1784	D	4	3.2	38.8	55.0	3.0	1.3							Ky. Geological Survey, 1890.	
Beaver Creek, Clear Creek of, R. Reynolds land, Van Lear bed.		D	2	1.5	40.1	56.8	3.1	1.3					14,200			
Otter Creek of, J. Hall land, Van Lear bed.		D	2	1.7	37.4	57.3	3.8	.7					8,006	14,410	Ky. Geological Survey, 1913. Do.	
Rock Fork of, E. Howard's land, Van Lear bed.		D	2	2.8	35.6	62.0	2.4	.7					8,111	14,600		
Caney Fork, right fork of Thornberry Branch of, Van Lear bed.		D	4	3.4	36.2	58.4	2.0	.9					7,966	14,230	Do.	
Goose Creek, Rock Fork of, R. Webb land, Van Lear bed.		D	2	3.5	37.5	60.4	2.1	.9					7,661	13,790		
Prestonburg; Preston mine, No. 1 bed	2886	D	4	2.5	36.7	52.3	8.5	1.6					7,928	13,730	Do.	
			2		37.6	53.7	8.7	1.6					7,906	14,230		
GREENUP COUNTY																
Amanda Furnace, No. 6 bed (outcrops)	1494	D	4	4.0	33.6	53.4	9.0	1.3							Do.	
From branch above the shops at Hunnewell Furnace, No. 6 bed (upper part).	1495	D	2	4.3	35.0	50.2	3.9	5.3								
Pennsylvania Furnace, near (drift opening).	1496	D	4	3.2	36.6	54.1	7.1	2.3							Do.	
Raccoon Furnace	1789	D	2	4.2	37.8	54.9	5.3	2.3								
Turkey Lick mine (main entry, 180 feet from opening).	1797	D	2	4.6	31.4	55.7	12.0	1.0							Do.	
			2		36.7	52.3	6.4	.7					7,279	13,690		
HARLAN COUNTY																
Agas; Brookside mine, Harlan bed (rib at face, 1 right entry, 1 main entry, 1,200 feet southeast of mine mouth).	81528	A	1	3.1	36.9	56.1	3.9	.8						7,456	13,420	Bureau of Mines. Do.
Same (composite of samples 81528 to 81532, inclusive).	81533	A	1	2.8	37.0	55.9	4.3	1.1						7,750	13,950	
			2		38.0	57.6	4.4	1.1						7,972	14,350	
			3		39.8	60.2	1.1						8,339	15,010	

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate			Calorific Value		Authority and Year						
	Lab. No.	Kind	Condition	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen		Oxygen	Air-drying Loss	Calo-ries	Thermal Units	Softening Temperature (° F.)	
HARLAN COUNTY—Continued.																		
Benham; Benham mine, "C" or Keillioka bed (face of 3 right entry, 1 left entry, Big Black heading).	24834	A	1	2.6	36.8	58.5	2.1	.5					.8	8,100	14,580		Bureau of Mines, 1918.	
Big Black Mountain; 1 mile south of Gil- lam's rock House, High Splint bed, Prospect pit (73¼-inch cut).	2271	B	2	4.5	36.3	56.0	3.2	.5					2.1				U. S. Geological Survey, 1906.	
Chevrolet; Crown by-product mine, Har- lan bed (rib of face, 2 main entry, 1,500 feet north 20° east of No. 2 mine mouth).	81833	A	1	2.5	36.7	56.9	3.9	.7					1.5	7,794	14,030	+2,740	Bureau of Mines.	
Coalgood; Mary Helen mine, Harlan bed (face of 2 north entry, 1,400 feet north- east of No. 2 mine mouth).	81739	A	1	2.2	37.2	56.7	2.9	.9					1.9	7,817	14,070	+2,740	Do.	
Coxton; Kayn mine, Harlan bed (rib at face of 5 right entry, 2 main entry, 3,100 feet northeast of mine mouth).	81523	A	1	2.7	37.7	56.2	3.4	.8					1.3	7,822	14,080	2,680	Do.	
Everts; Harlan Cooperative No. 1 mine, Dabry or C bed (face of straight butt entry, 600 feet southwest of mine mouth).	81534	A	1	2.9	37.8	54.1	4.2	.8					2.2	7,622	13,720	2,290	Do.	
High Splint; Harlan No. 1 mine, Harlan bed. Same (rib at face of 5 drift entry, 2,200 feet northeast of No. 1 mine mouth).	81699	A	1	4.7	35.7	51.5	8.1	.8					2.7	7,133	12,840	+2,740	Do.	
Kirts; Golden Ash mine, Harlan bed (face of 2 main entry, 2,000 feet north of mine mouth).	81518	A	1	3.9	36.5	56.0	3.6	.8					2.2	7,728	13,910	2,450	Do.	
Liggett; Mahan-Ellison mine, Harlan bed (rib at face of 2 butt entry, 700 feet northeast of No. 1 mine mouth).	81729	A	1	3.6	35.5	57.3	3.6	.9					1.5	7,789	14,020	+2,740	Do.	
JACKSON COUNTY																		
Branch of Horse Lick, J. T. Ballard's coal bank (cannel coal).	1847	D	4	2.0	43.7	45.5	8.8	3.4										
Richmond, 17 miles southeast of; Tom Coyle's coal bank (cannel coal).	1846	D	4	2.0	41.0	43.1	13.9	3.5										
			2		41.8	44.0	14.2	1.1										
JOHNSON COUNTY																		
Flambeau, southeast of; Flambeau mine, Cannel bed on chain pillar, 1 main entry, 150 feet southeast of mine mouth).	7133	B	1	2.4	48.4	38.7	10.5	1.2	6.5	72.0	1.2	8.6	1.5	7,650	13,770		U. S. Geological Survey, 1913.	
Lesley (East Point post office); Lesley mine Lesley bed (cannel coal).	5437	B	1	1.7	50.8	38.2	9.3	1.0	6.8	73.3	1.3	8.3	.4	7,917	14,250		Do.	
			2		51.6	38.9	9.5	1.0	6.8	74.3	1.3	8.9		8,056	14,500			
			3		57.0	43.0		1.2	7.5	82.3	1.5	7.5		8,894	16,010			
Paintsville, 5 miles southeast of; Miller Creek Country bank, Miller Creek bed (1 right entry, 100 feet west of mine mouth).	2405	B	1	7.0	35.9	56.0	2.0	.5					4.5	7,606	13,690		U. S. Geological Survey, 1906.	
Van Lear; Mine No. 1, No. 1 bed (face of 1 right heading, 1 entry).	10548	A	1	7.2	35.2	55.1	2.5	.5					4.4			2,280	Bureau of Mines, 1913.	
Same (composite of samples 10548 and 10549).	10550	A	1	6.4	36.2	54.2	3.2	1.2	5.7	74.9	1.5	13.5	3.7	7,478	13,460		Do.	
			2		38.7	57.8	3.5	1.3	5.9	80.1	1.6	8.2		7,989	14,380			
			3		40.1	59.9		1.3	5.5	82.9	1.6	8.7		8,278	14,900			
KNOTT COUNTY																		
Note.—Coals from some of the branches of the North Fork of the Kentucky River.																		
Big Branch, Gough & Co. mine, Haddix bed (face of entry).	2529	D	4	1.7	34.1	53.8	10.4	1.8										
Troublesome Creek, one-half mile above Henderson, Jasper Baker land, Hazard bed.	2755	D	4	1.4	41.7	52.2	4.7	1.1										
			2		42.3	53.0	4.7	1.1						*7,961	14,330			
														8,078	14,540			
KNOX COUNTY																		
Brandel, Bennett No. 1 mine, Dean bed (face of main entry, 2,400 feet from mine mouth).	21537	A	1	4.6	35.9	53.3	6.2	.7					2.6	7,406	13,330	2,940	Bureau of Mines, 1918.	
Elys, one-half mile northeast of; New Hughes mine, Jellico bed (face of 5 room, butt entry, 1 mile from mine mouth).	21542	A	1	4.0	34.8	54.8	6.4	1.5					2.1	7,439	13,390	2,410	Do.	
Trosper; Power mine, Dean bed (entry rib, 1 left entry, 2 openings, 600 feet west of mine mouth).	81241	A	1	4.5	36.4	52.6	6.5	.6					2.6	7,283	13,110	2,390	Do.	

Ky. Geological Survey, 1890.
Do.

U. S. Geological Survey, 1913.
Do.

U. S. Geological Survey, 1906.

Bureau of Mines, 1913.
Do.

Ky. Geological Survey, 1910.
Do.

Bureau of Mines, 1918.
Do.

Do.

Do.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Calorific Value		Softening Temperature (° F.)	Authority and Year				
	Lab. No.	Kind	Condition	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen			Calo-ries	British Thermal Units		
LAUREL COUNTY	21429	A	1	4.0	41.4	47.9	6.7	3.8					2.2	7,389	13,000	2,090	Bureau of Mines, 1918.	
			2															
	21389	A	1	3.2	41.6	46.2	8.9	4.7					1.6	7,261	13,070	2,090	Do.	
			2															
LAWRENCE COUNTY	1589	D	4	5.1	35.3	57.8	1.8	0.7									Ky. Geological Survey, 1890.	
			2															
	1591	D	4	2.1	33.9	56.0	8.0	.7									Do.	
			2															
	1861	D	4	1.8	34.6	57.2	8.2	.8										Do.
			2															
2997	D	4	3.0	35.2	55.2	6.7	1.0										Ky. Geological Survey, 1910.	
		2																
1859	D	4	3.3	34.2	55.3	7.2	.9										Do.	
		2																
LEE COUNTY	1897	D	4	4.0	35.5	55.5	5.0	1.0									Do.	
			2															
	2820	D	4	2.1	40.4	50.9	6.6	2.9									Ky. Geological Survey, 1910.	
			2															



HORST IN PINE MOUNTAIN FAULT

In the middle background may be seen the tilted beds of the middle and upper Mississippian limestone brought up by the Pine Mountain thrust fault at Jenkins, Ky. In the foreground is the artificial lake of the Consolidation Coal Co. power plant.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Calorific Value		Softening Temperature (° F.)	Authority and Year			
	Lab. No.	Kind	Condition	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen			Air-drying Loss	Calories	British Thermal Units
LESLIE COUNTY																	
Note.—Analyses of samples from outcrops and prospects along the Middle Fork of the Kentucky River.																	
Old House Branch, Henry Begley land, Hazard bed.	2734	D	4	1.9	38.3	52.4	7.4	7						7,561	13,610	Do.	
Burnt Camp Creek, Jesse Morgan land, Fire Clay bed.	2738r	D	4	.7	34.7	55.2	9.4	1.0						7,711	13,880	Do.	
Beach Fork, Old House Branch of, Silas Nantz land, Hindman bed.	2743	D	2	1.3	33.3	56.1	9.6	1.0								Do.	
LETCHER COUNTY																	
Flemings, near; Elkhorn 301 mine, Elkhorn bed (face of 4 room, 2 left headings, 1,300 feet from mine mouth).	21308	A	1	2.9	37.3	55.9	3.9	.7						7,814	14,070	Bureau of Mines, 1914.	
Same (composite of samples 21308 to 21311, inclusive).	21312	A	1	3.6	36.8	55.5	4.1	.6	5.5	78.8	1.6	9.4	2.0	7,750	13,950	Do.	
Jenkins, Consolidation No. 204 mine, upper Elkhorn bed (face of main heading, 1,700 feet from mine mouth, 7 foot 3/4 inch cut).	14994	A	1	3.9	33.8	54.8	7.5	.5	5.5	85.4	1.7	6.7	1.9	7,461	14,430	Do.	
McRoberts, Consolidation No. 213 mine, Elkhorn bed (face of 1 right entry, 1 left face heading).	21294	A	1	3.3	36.8	56.6	3.3	.6						7,833	14,110	Bureau of Mines, 1918.	
Poor Fork, Frank's Creek of, Oven Fork of, Imboden coal (outcrop).	G3711	D	2	1.5	34.0	56.1	8.4	1.3					.4	7,900	14,220	Ky. Geological Survey, 1916.	
MADISON COUNTY																	
Near head of Frank's Creek, Taggart coal (outcrop).																	
Same, High Splint coal (outcrop).	G3709	D	1	1.4	36.8	56.4	5.4	.7						7,933	14,370	Do.	
Note.—A few coals from the North Fork of the Kentucky River and its branches.																	
Shibley Fork of Trace Fork of, Flag coal (outcrop).	G3734	D	1	2.3	37.8	55.4	4.5	.7						7,517	13,530	Ky. Geological Survey, 1916.	
Elkhorn Branch of, Ambursy coal (outcrop).	G3701	D	2	1.6	41.7	49.5	7.2	2.7						7,689	13,840	Do.	
Daniels Branch of Fire Clay coal (outcrop).	G3702	D	1	2.4	38.0	56.3	3.3	.8						7,706	13,870	Do.	
Daniels Branch, head of, Hindman coal (outcrop).	G3703	D	2	2.9	35.9	53.2	7.0	.7						7,828	14,090	Do.	
Camp Branch of, Elkhorn coal (outcrop).	G3706	D	1	1.4	39.4	54.4	4.8	1.7						8,156	14,680	Do.	
Same, head of, Whitesburg coal (outcrop).	G3896	D	2	3.6	35.3	55.1	6.0	.8						7,756	13,960	Ky. Geological Survey, 1916.	
Potter Fork of, No. 303 mine, Elkhorn bed (face of entry, 500 feet from mine mouth).	G3727	D	2	2.5	36.5	58.1	2.9	.7						7,706	13,870	Do.	
MADISON COUNTY																	
Jox's coal bank, top of Big Hill.																	
M. Moran's mine, top of Big Hill, beside the road.	1877	D	4	2.7	33.7	56.1	7.5	.8								Ky. Geological Survey, 1890.	
MAGOFFIN COUNTY																	
Burning Fork, opposite Kelly Branch; T. J. Rice land, Whitesburg coal.	G3795	D	1	4.6	34.7	53.8	6.9	2.2						7,550	13,590	Ky. Geological Survey, 1919.	
Gapville post office; head of Punchedon Creek, Fugate coal.	G3798	D	2	6.2	23.2	62.4	7.2	2.3						7,917	14,250	Do.	
Grape Creek, 1 left branch of, Haddix coal.	G3794	D	2	24.7	67.7	7.6	.9	.9						7,450	13,410	Do.	
Head of Oakley Creek, Joe Watson land, Hazard coal.	G3797	D	1	6.7	28.9	56.2	8.2	.8						7,939	14,290	Do.	
Big Run Branch of Trace Fork, Noel Wireman land, Whittaker coal.	G3804	D	2	3.5	31.2	55.6	9.7	.8						7,644	13,760	Do.	
			2	32.3	57.7	10.0	.8	.8						7,589	13,660	Do.	

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Calorific Value		Authority and Year			
	Lab. No.	Kind	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	Air-drying Loss		Calo-ries	British Thermal Units	Sotemins (° F.)
MARTIN COUNTY																
Warfield; mouth of Collins Creek, No. 1 coal (entry near salt works). "Warfield splint coal"	1883	D	4	2.2	33.6	55.0	9.2	2.6								Ky. Geological Survey, 1890. Do.
	1885	D	4	2.2	34.3	56.3	9.4	2.6								
	2658	D	2	3.2	33.1	52.7	12.0	.6								
Copperas Gap, head of Middle Fork, Rockcastle Creek, E. coal.		D	4	3.2	33.8	53.9	12.3	.6								Ky. Geological Survey, 1910.
		D	2	3.9	39.9	52.9	7.2	.9								
MCCREARY COUNTY																
Shoopman; Fidelity mine, No. 1 or Hudson bed (face of 2 west main entry, 1,300 feet west of mine mouth).	82631	A	1	3.3	37.5	50.5	8.7	1.9				1.3	7,233	13,020	2,510	Bureau of Mines.
Worley; Worley or No. 4 mine, No. 1½ bed (rib at face 3 right crosscut, 2 west entry, 1,300 feet northwest of mine mouth).	82643	A	1	.3	35.0	55.3	5.4	.6				1.8	7,440	13,390	2,740	Do.
Same (face of last crosscut, slope, 16 left entry, 1 east main entry, 5,800 feet northeast of mine mouth).	82645	A	1	4.1	35.3	55.9	4.7	.5				1.9	7,522	13,540	2,740	Do.
MENIFEE COUNTY																
Harkins Creek, near county line, subconglomerate.	1601	D	4	2.9	33.1	56.6	7.4	1.0								Ky. Geological Survey, 1890. Do.
Mouth of Gladly Creek, Ledford's land, subconglomerate.	1602	D	2	2.7	34.0	50.2	13.1	4.1								Do.
Frenchburg, Old Slate Branch; Adam's bank.	1896b	D	2	5.0	32.4	58.4	4.2	.6								Do.
		D	2	34.1	61.5	4.4	.6									
MORGAN COUNTY																
North Fork of Licking River, May Oakley Branch; H. M. Collins mine (cannel coal).	2074	D	4	1.6	49.7	31.7	17.0	1.9								Ky. Geological Survey, 1910. Do.
Wrigley; North Fork Cannel Coal mine, No. 1 coal.	3062	D	2	1.3	52.7	32.7	13.3	1.6								Do.
"Pierat's cannal coal"	1890	D	4	2.1	53.4	35.1	13.5	1.6								Ky. Geological Survey, 1890. Do.
	1891	D	2	4.9	49.6	43.2	5.1	1.0								Do.
Elk Fork of Licking River, Maynhier's bank (cannel coal).	1891	D	4	2.3	41.6	44.7	11.4	1.3								Do.
West Liberty, near (6-foot coal)	1892	D	2	4.3	42.6	45.7	11.7	1.3								
		D	2	36.8	52.3	10.9	1.1									
OWSLEY COUNTY																
Boonsville, 1 mile from; Gabbard Fork, D. H. Reynolds' bank.	2318	D	4	2.0	36.8	53.7	7.5	1.1								Ky. Geological Survey, 1910. Ky. Geological Survey, 1890.
Four miles above; South Fork of Kentucky River; Steffee and Samuel mines.	1936	D	2	2.1	35.2	58.7	4.0	1.4								Do.
		D	2	36.0	59.9	4.1	1.5									
PERRY COUNTY																
Domino; Himyar mine, Haddix, Hazard, or No. 6 bed (face of 2 left entry, 800 feet from mine mouth).	21334	A	1	6.1	35.0	53.0	5.9	.6				3.6	7,256	13,060	2,560	Bureau of Mines, 1918.
Same (composite of samples 21334 to 21337, inclusive.)	21338	A	1	5.3	34.9	51.7	8.1	.7				5.4	72.5	1.6	11.7	Do.
		A	2	36.8	54.7	8.5	.8					5.0	76.6	1.6	7.5	Do.
		A	3	40.3	59.7	4.0	.7					5.5	83.7	1.8	8.1	Do.
Douglas; Douglas mine, Fire Clay, Dean, or No. 4 bed (face of 4 room, 2 right entry, 500 feet from mine mouth).	21354	A	1	5.8	36.2	56.0	4.0	.7				1.9	7,683	13,840	2,840	Do.
Hazard; one-half mile east of; Hazard mine, Fire Clay bed (face of 3 west entry, 1,800 feet southwest of mine mouth).	21364	A	1	3.7	37.3	55.9	3.1	.7				1.9	7,756	13,960	2,910	Do.
Lothair; one half mile southeast of; Ashless mine, Fire Clay, Dean, or No. 4 bed (face 1 main entry, 700 feet from mine mouth).	21349	A	1	4.1	36.3	54.8	4.8	.6				2.3	7,583	13,650	2,540	Do.
Note.—Several coals from along the North Fork of the Kentucky River.																
Two miles above Sixteen Mile Creek of J. H. Campbell's land, Flag coal (outcrop).	2732	D	4	2.1	38.6	54.2	5.1	.8								Ky. Geological Survey, 1910.
Middle Fork of the Kentucky River, one-fourth mile above Squabble Creek, Peter Gross mine, Haddix bed (face of entry, 25 yards in entry).	2795	D	2	1.9	37.1	57.9	3.1	.8								Ky. Geological Survey, 1910.

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
EASTERN KENTUCKY FIELD—Continued

Locality, Mine, etc.	Sample		Proximate						Ultimate				Calorific Value		Authority and Year		
	Lab. No.	Kind	Condition	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen	Loss	G-calories		British Thermal Units	Softening Temperature (° F.)
PIKE COUNTY																	
Hellier, Edgewater mine, Lower Elkhorn bed (face of main entry).	3085	D	4	1.7	32.4	64.1	1.8	5						8,244	14,840	Do.	
			2		33.0	65.2	1.8	.5						8,383	15,090		
Same (1,600 feet south of opening, main heading, right parallel entry 4).	6929	B	1	3.4	32.1	58.8	5.7	.5	5.2	77.0	1.8	10.3	2.0	7,739	13,430	U. S. Geological Survey, 1906.	
			2		33.2	60.9	5.9	.6	5.0	19.3	1.2	7.6		8,011	14,420		
Lookout, Henry Clay mine, Lower Elkhorn bed (face of 6' room, 2 left entry).	3686	D	4	1.8	33.0	62.2	3.0	.7						7,883	14,190	Ky. Geological Survey, 1910	
Regina, near Coleman Hollow, Coleman mine, Millard bed.	3662	B	1	3.0	32.2	63.3	3.1	.7						8,022	14,440	U. S. Geological Survey, 1906.	
			2		33.2	58.4	8.4	1.1					1.4				
POWELL COUNTY																	
Dundee, 1 mile from Clear Branch, No. 1 coal (lowest coal above the limestone).	2822	D	4	3.0	37.6	43.8	15.6	4.6						*6,100	10,980	Ky. Geological Survey, 1910.	
			2		38.8	45.2	16.0	4.7						6,289	11,320		
FULASKI COUNTY																	
Cumberland coal banks, 2 miles south of river, 9 miles from Rockcastle Springs (50 feet from mine mouth).	1944	D	4	2.4	36.8	50.2	10.2	2.5									
			2		37.7	51.4	10.9	2.3									
Doolin coal bank, 1 mile from river, 10 miles from Rockcastle Springs (head of entry, 75 feet from mine mouth).	1945	D	4	2.0	35.3	52.9	9.8	3.6								Do.	
			2		36.0	54.0	10.0	3.7									
ROCKCASTLE COUNTY																	
Livingston; Grisham's coal mine, Upper "Brashy Coal" bed.	1949	D	4	2.2	35.9	54.9	7.0	4.3								Ky. Geological Survey, 1890.	
			2		36.7	56.1	7.2	4.4									

WHITLEY COUNTY

Kensee; Main Jellico mines, Jellico bed (one mine).
Mount Morgan mine, Jellico bed (face of 4 entry, 24 room, II entry, average of two samples).
Williamsburg; Gatliff mine (top bench).....

WOLFE COUNTY

Campton; Henry Alexander's bank.....
Four and one-half miles from; Hobb's bank on Benjamin Baker's land (splint coal).

U. S. Geological Survey, 1913.
Ky. Geological Survey, 1910.
Ky. Geological Survey, 1910.

Do.
Do.

WESTERN KENTUCKY FIELD

BUTLER COUNTY

Green River, 2 miles from; Stevens' bank on Bear Creek.
Morgantown, 1½ miles southwest of; Gil- lam mine (left rib, 1 room, main west entry, 100 feet from mine mouth).
Mud Creek, mouth of; Mining City coal bank (new opening).

CHRISTIAN COUNTY

Empire, three-quarter mile west of, Em- pire mine, Empire bed (face of main south entry, 3,000 ft. from shaft bottom).
Mannington; William's mine, Empire bed (face of 1 room, 2 north entry, 8½ feet from entry).

CRITENDEN COUNTY

Blackford; 2 miles from; designated as No. 1 coal.
Sullivan; 3 miles west of; Barnaby mine (200 feet east of mine mouth).

Note.—Samples marked (W) were analyzed in the Washington laboratories of the Bureau of Mines.

1329	B	1	5.0	36.1	54.5	4.4	4.4	.9									2.6	7,561	13,610	U. S. Geological Survey, 1913.		
		2		38.0	57.3	4.7	1.0	1.0										7,961	14,330	Ky. Geological Survey, 1910.		
2796	D	2	1.2	37.5	58.5	2.8	2.8	1.2										7,839	14,110	Ky. Geological Survey, 1910.		
		2		38.0	59.1	2.9	2.9	1.2										7,933	14,280			
3658	D	4	2.3	43.3	52.2	2.2	2.2	.6										*7,844	14,120	Ky. Geological Survey, 1910.		
		2		44.3	53.5	2.2	2.2	.6										8,033	14,460			
2923	D	4	3.3	36.7	52.3	7.7	7.7	2.1										6,967	12,540	Do.		
		2		37.9	54.1	8.0	8.0	2.2										7,206	12,970	Do.		
1966	D	4	3.5	35.2	56.7	4.6	4.6	1.2														
		2		36.5	58.7	4.8	4.8	1.2														
WESTERN KENTUCKY FIELD																						
1313	D	4	3.4	30.7	54.9	11.0	11.0	2.5														
		2		21.7	56.9	11.4	11.4	2.6														
19399	A	1	8.9	39.3	42.6	8.2	8.2	3.1										3.6	6,689	12,040	Bureau of Mines, 1918.	
1995	D	4	3.3	44.2	48.5	4.0	4.0	3.1														
		2		45.7	50.2	4.1	4.1	3.2														
19293	A	1	11.2	34.5	52.7	1.6	1.6	.8											6.6	7,056	12,700	Bureau of Mines, 1918.
70506	A	1	9.1	34.9	46.9	9.1	9.1	2.9											6.644	11,960	Bureau of Mines, In print.	
	W	2		38.4	51.6	10.0	10.0	3.2											7,311	13,160		
3042	D	4	2.1	31.7	60.5	5.7	5.7	1.4											*7,594	13,670	Ky. Geological Survey, 1910.	
		2		32.3	61.9	5.8	5.8	1.4											7,750	13,950		
23894	A	1	4.4	36.8	51.1	7.7	7.7	3.4											2.5	7,883	13,290	Bureau of Mines, 1918.
		2		38.3	53.4	8.1	8.1	3.6											7,722	13,900		

TABLE 1.—CHEMICAL ANALYSES OF MINE SAMPLES.
WESTERN KENTUCKY FIELD—Continued.

Locality, Mine, etc.	Sample		Proximate				Ultimate				Calorific Value		Authority and Year				
	Lab. No.	Kind	Condition	Moisture	Volatile Matter	Fixed Carbon	Ash	Sulphur	Hydrogen	Carbon	Nitrogen	Oxygen		Air-drying Loss	Calo-ries	British Thermal Units	Softening Temperature (° F.)
DAVIESS COUNTY																	
Knottsville, near; Friendly Grove, Richardson's land, Duncan's bank.	1761	D	4	6.2	41.9	47.4	4.5	3.7									Ky. Geological Survey, 1890.
			2		44.7	50.5	4.8	4.0									
Three miles west of; Bon Harbor Hills, Owensboro mine.	2870	D	4	7.9	33.7	44.7	13.7	4.0						6,522	11,740		Ky. Geological Survey, 1910.
			2		36.6	48.5	14.9	4.4						7,078	12,740		
EDMONSON COUNTY																	
Bear Creek, Mill Branch of (level of main Nolin coal).	1414	D	4	3.6	33.0	54.0	9.0	2.1									Do.
			2		34.2	56.5	9.3	2.2									
Dismal Creek, Knob Lick (main Nolin coal).	1416	D	4	2.6	33.8	53.1	10.5	2.4									Do.
			2		34.7	54.6	10.7	2.5									
HANCOCK COUNTY																	
Cloverport; 8 miles south of; Cloverport mine (at main breast, 12 entry, canal coal).	1813	D	4	1.3	30.6	27.0	12.1	1.9									Ky. Geological Survey, 1890.
			2		60.4	27.3	12.3	1.9									
Hawesville, near; Davidson bank.	1822	D	4	2.3	39.0	50.5	7.2	3.4									Do.
			2		40.3	52.2	7.5	3.5									
HENDERSON COUNTY																	
Baskett; No. 1 mine, No. 9 bed (face of main entry south entry, 3,000 feet from shaft).	18962	A	1	12.2	35.6	42.3	9.9	2.9					3.9	6,183	11,130	2,020	Bureau of Mines, 1918.
Corydon; Corydon mine, No. 12 bed (face of 8 room, 2 south entry, 1,000 feet from shaft).	19103	A	1	12.1	35.3	41.2	11.4	3.3					5.4	5,967	10,740	1,860	Bureau of Mines, 1918.
HOPKINS COUNTY																	
Henderson; 1½ miles south of; Nicholson mine, No. 9 bed (face of 4 rooms, 2 west entry, 1,250 feet from shaft).	18973	A	1	11.3	36.6	41.4	10.7	2.9					4.9	6,178	11,120	2,080	Bureau of Mines, 1918.
Smith Mills; Smith Mills mine, No. 12 bed.	3110	D	4	7.6	32.2	49.2	11.0	2.2					6,822	11,380		Ky. Geological Survey, 1910.	
			2		34.9	53.2	11.9	2.3					6,839	12,310			
HOPKINS COUNTY																	
Barnsley; Barnsley mine, No. 9 bed (face of 3 west entry, 52-inch cut).	1361	B	1	9.1	36.2	46.6	8.1	3.0					3.3				U. S. Geological Survey, 1906.
			2		39.8	51.3	8.9	3.3					5.6	7,066	12,700	2,120		Bureau of Mines, 1918.
Dawson Springs; one mile north of; J. W. Workman mine, Dawson bed (face of main east entry, 500 feet east of shaft).	19298	A	1	9.0	39.0	47.7	4.3	2.7					4.7	6,528	11,750	2,100	Do.
Earlington; one-half mile southeast of; No. 9 mine, No. 9 bed (face of main north entry, 4,000 feet from mine mouth).	19204	A	1	8.5	35.7	45.8	10.0	4.0									Do.
Eureka; Eureka mine, No. 11 bed (face sample, 6 inches, west entry).		D	4	3.3	40.6	50.2	5.9	3.5									Smith, Rudy & Co., Philadelphia, 1912.
			2		41.9	52.0	6.1	3.7									
Note.—The analyses from the Eureka mine, by Smith Rudy & Co., Philadelphia, are copied from bulletins of the Kentucky Geological Survey.																	
Madisonville; 1 mile west of; Reinecke mine, No. 11 bed (face of 8 west entry, main north entry, 1¼ miles from shaft).	19194	A	1	6.5	39.7	46.4	7.4	3.8					3.3	6,944	12,500	2,310	Bureau of Mines, 1918.
Nebo; 3 miles south of; Nebo mine, No. 14 bed (last cut-through, 2 east entry, north entry, 3,000 feet from mine mouth).	19230	A	1	9.4	35.3	43.3	12.0	3.7					6.0	6,217	11,190	2,080	Do.
Nortonville; 1,000 feet west of; Norton No. 1 mine, No. 11 bed (face of 23 room, 1 west back heading, 2,500 feet from shaft).	19237	A	1	7.4	39.4	45.9	7.3	3.7					3.6	6,817	12,270	1,950	Do.
St. Charles; 2 miles northwest of; Carbonate No. 1 mine, No. 9 bed (face of 7 west entry, 6 north entry, 4,900 feet from mine mouth).	19261	A	1	8.9	37.7	45.9	7.5	2.5					6.1	6,678	12,020	2,190	Do.
Isley; Crabtree mine, No. 9 bed (38 room, 10 east entry).	3103	D	4	4.5	37.9	48.7	7.9	2.9					6.811	12,260		Ky. Geological Survey, 1912.	
			2		39.7	52.1	8.2	3.0					7,128	12,830			
Oak Hill mine (face of 9 room, 1 south entry, 14 room, 1 south entry).	2789	D	4	1.7	40.0	50.1	8.2	2.8					6,567	11,820		Ky. Geological Survey, 1910.	
			2		40.7	51.0	8.3	2.9					6,683	12,030			
MCLEAN COUNTY																	
Island; Green River mine, No. 9 bed (face of 1 room, 1 north entry, east side of shaft).	2901	D	4	2.9	39.5	49.2	8.4	3.5					6,753	12,160		Do.	
			2		40.7	50.6	8.7	3.6					6,966	12,530			

CHAPTER VII.

GEOLOGY AND PRODUCTION OF COAL

To adequately outline the geology of the coals found in Kentucky would require space far in excess of that allowed in this book. The main points may, however, be stated within small compass. Kentucky's coal fields are now two separate and distinct units, though time was, when following the Paleozoic era for many, many ages they were actually a single coal field from Livingston county on the Ohio in the west to Martin county on the Tug Fork of the Big Sandy in the east. Long since, their point of union, which was just south of the Blue Grass region, has worn away, due principally to uplifts of the Cincinnati arch. Waste of that once continuous strata may still be found stretching out towards central Kentucky on the hill tops from either side. The shortest distance between the two fields is an airline of about fifty-five miles from a point on the divide between Taylor and Marion counties slightly northwest of Campbellsville to the continuous coal measure outcrop near Monticello in Wayne. Coal measure outliers occur in Casey, Lincoln and other intermediary counties indicating positively a former connection between these great coal fields. This is plainly seen by a glance at the new (1923) geological map of Kentucky.

The eastern coal field covering an area of 10,450 square miles lies in a great structural trough or geo-syncline, the southeast edge of which is the Cumberland range and the northwest side of which is the Cincinnati arch. The eastern field contains thirty-seven counties, producing and non-producing, and occupies the whole of the eastern part of the state. The border counties of the eastern coal field are Menifee, Powell, Estill, Lewis, Rowan, Madison, Rockcastle, Pulaski, McCreary, Wayne and Clinton. The interior counties are Greenup, Boyd, Carter, Elliott, Lawrence, Morgan, Johnson, Martin, Wolfe, Magoffin, Floyd, Pike, Lee, Breathitt, Knott, Jackson, Owsley, Perry, Letcher, Laurel, Clay, Leslie, Whitley, Knox, Harlan and Bell.

The western coal field covers an area of 4,680 square miles and lies in a broad and deep structural basin, the southern tip of the great interior coal field of Illinois and Indiana. The western coal field contains twenty-one counties, twelve of which are



marginal counties and show but a small portion of the coal measures. These border counties are Hancock, Breckinridge, Grayson, Hart, Edmonson, Warren, Butler, Logan, Todd, Christian, Caldwell, Crittenden and Livingston. The counties located entirely within the western field are Daviess, Union, Henderson, McLean, Ohio, Muhlenberg, Hopkins and Webster, and these are of course the largest producers.

The coals of the eastern Kentucky coal field are many, the exact number of which is not known, though many tentative and regional correlations have been made. The field generally lacks adequate correlation of its coals, which may not be accomplished for some time, due to the inability of private individuals to undertake so great a task, and lack of provision for this important work by the General Assembly. Although the Western coal field is completely mapped topographically to the scale 1:62,500, the Eastern field is less than 50% mapped to this scale. While the lack of complete detailed topographic mapping has made it impossible to figure with precision the amount of coal in the ground in Kentucky, some estimates of value have been made. Probably the best of these is that of the U. S. Geological Survey which indicates 122,900,000,000 short tons for all of Kentucky. Of this large amount 67,500,000,000 tons are assigned to the Eastern field is less than 70% mapped to this scale. While the entire area of the Eastern and Western coal field is mapped geologically these tonnage figures will have to be considerably revised.

COAL MEASURE STRATIGRAPHY.

The beginning of what will some day result in the complete and detailed geology of the coal measures of Kentucky has been made. The several geological formations which occur in that important region lying between the Pine and Cumberland Mountains in southeastern Kentucky have been given,¹ in descending order, the following names: (1) Bryson formation, (2) Hignite formation, (3) Catron formation, (4) Mingo formation, (5) Hance formation, and (6) Lee formation. Excepting the Lee, which contains the easily recognizable white quartz conglomerate sandstone and has become state-wide in application, none of these names are used outside of this region. That portion of

¹Ashley, G. H. and Glenn, L. C., Geology and Mineral Resources of Part of the Cumberland Gap Coal Field in Kentucky: U. S. G. S., Prof. Paper 49, 1906.

southwest Virginia adjacent to Pike and Letcher counties, Kentucky, has been subdivided in descending order into the following units: (1) Harlan sandstone, (2) Wise formation, (3) Gladeville sandstone, (4) Norton formation, and (5) Lee formation. In the vicinity of London² on the western border of the eastern coal field the lower coal measures have been divided into (1) the Breathitt, and (2) the Lee formations.



A STRIPPED OUT AREA.

The No. 9 coal has all been removed in this cut near Ilsley in Hopkins County, Ky. It is the only instance of its kind in that locality at the present time. Eventually this condition will become general in stripping regions.

On the east and northeast geologists working in West Virginia and Ohio have brought across the Kentucky line into the lower Big Sandy valley³ several standard formational names for divisions of the coal measures. These in descending order are: (1) Monongahela formation, (2) Conemaugh formation, (3) Allegheny formation, and (4) Pottsville formation. The principal commercial coals of eastern Kentucky are found in that group of rocks which is now indeterminately regarded as belonging to the Pottsville. The aerial extent of the Allegheny and Conemaugh correlatives in this part of Kentucky is small. The commercial coals of Eastern Kentucky have been tentatively correlated* as follows:

² Campbell, M. R., The London Folio, No. 47, U. S. Geological Survey, 1898.

³ Phalen, W. C., The Kenora Folio, No. 184 (Field Edition), U. S. Geological Survey, 1913.

*Presented before Geol. Sec. A. A. A. S., Cincinnati, O., Dec. 27, 1923, by J. S. Hudnall, revised by W. R. Jillson, 1924.

CORRELATION OF THE COALS OF EASTERN KENTUCKY

BIG SANDY BASIN		KENTUCKY RIVER BASIN		CUMBERLAND RIVER BASIN		Owen Survey
Tug Fork	Levisa Fork	North and Middle Fork	South Fork	South Fork and Lower Cumberland Drainage	Upper Cumberland Drainage	
Richardson or No. 5 Block	Richardson	Helton Hindman Francis	Helton Hindman	Lower Cumberland Drainage	High Splint	8
Broas or Stockton Broas		Flag	Flag		Cornett	7
Peach Orchard or Coalburg	Peach Orchard	Hazard	Hazard			6
Buffalo Cr. Thacker	Haddix Limestone	Haddix Limestone Hamlin	Haddix Limestone Hamlin	Pardee		5
Fire Clay Rider or Chilton	Fire Clay Rider *Fire Clay C.	Fire Clay Rider Fire Clay	Fire Clay Rider Fire Clay C.	Dean or Fire Clay Dean		4
Little Fire Clay or Little Chilton	Little Fire Clay	Little Fire Clay	Little Fire Clay			
Whitesburg	*Whitesburg	Whitesburg	Whitesburg	Vander Pool		3
Alma or Elkhorn Upper Morrowbone	*Elkhorn *Van Lear or Miller's Creek or Upper Morrowbone	Whitesburg Elkhorn No. 2 Elkhorn	Moore Coal Howard Lower Howard	Jellico Upper Blue Gem	Taggart Collier	2
Pond Creek or Warfield Matewan Eagle	Lower Morrowbone or Shelby Gap Bingham Millard	No. 1 Elkhorn Sharon	Burns Manchester or Zachariah	Bacon Cr. or Lower Blue Gem Lily	Harlan	1
	Auxier Carson Elswick Stateline Tunnel Drainage		Beattyville	Barren Fork Beaver Creek Hudson		

*Fre quently cancell.

In western Kentucky the coal measures have been broken⁴ up into five formational units which in descending order are as follows: (1) Dixon formation, (2) Lisman formation; (1 and (2) are Conemaugh), (3) Carbendale (all of 3 and upper part of 4 are Allegheny), (4) Tradewater formation, and (5) Caseyville formation (the lower part of 5 and all of 6 are Pottsville). In this part of the state the Allegheny contains the important commercial coals which are numbers 9 and 11. Border counties in the western coal field produce from the Caseyville formation which is of Pottsville age.

The principal coals now mined in their type locality in Eastern Kentucky are: (1) Elkhorn seam, Pike and Letcher counties; (2) Amburgy seam, Letcher county; (3) Freeburn,



A COAL MINE IN THE HAZARD FIELD

Although most of the operations in the southern Perry County coal field are smaller than many which are found in Bell, Harlan, Letcher, and Pike counties, the quality of the coal is very high. This tippie and camp belong to the Hazard-Blue Grass Coal Co. The mine is near Hazard.

Upper Thacker, Lower Thacker and Alma seams, Pike county; (4) Millers Creek (Van Lear) seam, Johnson and Floyd coun-

⁴ Glenn, L. C., *Geology and Coals of Webster County, Kentucky*. Kentucky Geol. Survey, Series VI, Vol. 5, 1922.

ties; Harlan or Straight Creek seam, Knox, Whitley, Bell and Harlan counties; (5) Wallins Creek or Dean or Fire Clay seam, Harlan, Perry, Breathitt and Lee counties; (6) High Splint seam, Harlan county; (7) Leonard seam, Harlan county; (8) Keokee or Kellioka seam, Harlan county; (9) Cornett seam, Harlan county; (10) Hazard or No. 6 seam, Perry and Breathitt counties; (11) Flagg or No. 7 seam, Perry county; Upper and Lower Marrowbone seams of Pike county; the Jellico seam in Whitley, Harlan and Bell counties; and many others of local or undeveloped importance.

These coals of eastern Kentucky exhibit many of the excellent qualities of the coals of the Appalachian basin, to which they belong geologically and geographically. They are bituminous, have a high volatile content and are generally low in ash and moisture. These characteristics make many of the seams well adapted for coking and the manufacture of artificial gas. Furthermore, many of these coals are what is known as "splint" or "block" coals, which makes them very desirable for domestic purposes. The eastern coals range in heat values from 13,000 to 14,000 B. T. U.'s which gives them a widespread demand as steaming coals. Lastly, these coals are the "low sulphur coals" of Kentucky, many of them ranging down as low as .75 and lower, which is a very desirable factor for general or coking purposes. Drift mining is the principal method of coal operation in eastern Kentucky. Stripping has but local importance. Shaft mining is a method of the future in this field. The Chesapeake & Ohio, the Baltimore & Ohio, the Louisville & Nashville, the Cincinnati Southern railroads and a few insignificant short lines serve the eastern field. Some little coal is still barged from Lee county on the Kentucky river.

Any enumeration or discussion of the coals of the eastern part of this state would be incomplete without some reference to the cannel coals of this region, which are found: (1) As unit seams, and (2) constituting a portion or bench of the main seam. The best cannel coals in the United States occur in Kentucky, which produces more cannel coal than any other state. The best cannel coals in Kentucky occur in Morgan county, but Bell, Carter, Elliott, Floyd, Magoffin, Breathitt, Knox, Johnson and Leslie counties also produce excellent cannel coals. The principal portion of the production is shipped to the northwest and Canada,

where it used for domestic fuel and as an enricher in the manufacture of illuminating gas. Kentucky cannels of good grade average about 55 per cent volatile matter, and therefore compare favorably with any other cannels produced.



THE FLAG (NO. 7) COAL

This coal, though high in the section in the Hazard field, is important because of its thickness. The characteristic parting is well shown. This facing is the property of the Hazard-Star Coal Corporation.

While the coals of the western Kentucky coal field are less in total number than those of the eastern field, there are several very excellent coals to be found in this portion of the state.

Those coals which enjoy the widest commercialization, with the localities in which they are now being operated, are: (1) No. 12 seam, Hopkins and Webster counties; (2) No. 11 or Herrin seam, Webster, Hopkins, Union and Ohio counties; (3) No. 9 or Springfield seam, Muhlenberg, Henderson, Ohio, Union, Webster, Hopkins, McLean and Daviess counties; (4) No. 14, Muhlenberg county; (5) Nebo seam, Hopkins and Henderson counties; (6) Mannington or Empire seam, Christian county.

The coals of the western Kentucky coal field are a unit geologically and chemically with the interior field of Illinois and Indiana. Like the coals of these adjoining states, these western Kentucky coals are bituminous, and when compared with eastern Kentucky, West Virginia and Pennsylvania coals they are found to be relatively high in volatile matter, ash and sulphur. While somewhat softer than the eastern coals they are free burning, and therefore command a large domestic and steaming market. They are excellent gas producers and can also be coked. Slope and shaft mining are the principal methods used in this field, though stripping or open pit (steam shovel) mining has become of considerable importance in some districts during the last few years. The Illinois Central, the Louisville, Henderson and St. Louis, and the Louisville and Nashville railroads serve the western field.

KENTUCKY'S COAL PRODUCTION.

There is, perhaps, no better way to evaluate the factors of growth which have operated in the development of Kentucky's coal fields than to review the total yearly figures of production. For the period extending from 1828 to 1923 inclusive, the total production figures reach the stupendous volume of 474,436,561 tons, of which more than one-half, 247,225,174 tons, has been produced in eight years, 1915 to 1922 inclusive, as compared with 227,211,387 tons of the total production for the eighty-six years recorded prior to 1915. It may be seen by a review of the table given herewith that the forced production of coal in Kentucky during the last decade has been little short of marvelous; in fact, the production in the last three years, 1920-1922, inclusive, has reached the figure of 111,093,024 tons, valued at about \$390,917,732 at the mine. In 1921, the last year for which detailed figures are now available, the price of Kentucky coal at the mine was

\$2.69 per ton. During the same year the average price for eastern Kentucky coal was \$2.77, while that of western Kentucky averaged \$2.48 per ton at the mine.

To further appreciate the great change that has come about in the production of coal in Kentucky in the last thirty years one needs but to glance at the older official reports and maps of the state mining inspector. In 1887 a map of the state of Kentucky, scale 20 miles equals one inch, was prepared by J. B. Hoeing, topographer for the Kentucky Geological Survey, and printed by the State Inspector of Mines. It showed the eastern and western coal fields in brown color on a blue and black base of the state, and located all of the mines in Kentucky. According to this map there were (in 1887) 88 mines in western Kentucky, and 41 mines in eastern Kentucky. In western Kentucky the principal development was in Hancock, Daviess, Ohio, Muhlenberg and Hopkins counties, Ohio and Muhlenberg heading the list. In eastern Kentucky there were only four mines in the Big Sandy valley, two in Johnson, and two in Lawrence. There was a group of ten mines in western Boyd and eastern Carter counties, and seventeen mines in Laurel county. The Jellico district in Whitley county was developed with three mines; and southern Pulaski, now McCreary county, showed four mines. The great coal producing regions of the present day in Pike, Letcher, Harlan, Perry, Floyd, Knox and Bell counties were without a single mine.

The trend of coal production in Kentucky at present seems to be toward greater records of volume than ever in the past. According to the most recent statistics¹ 1,157,467 tons of coal in excess of that produced in the first six months of 1922 were produced in this state in the same period of 1923, though it should be pointed out that the total volume for the first half of this year is not quite one-half the total volume of coal produced in Kentucky in 1922. The production for January to June inclusive of 1923 is given as 18,424,599 tons in 54 working days as compared to 17,267,132 tons during the same period in 1922, in 69 days. The number of mines now operating is 842 as compared to 731 in 1922, an increase of 111. The total number of men now employed is 56,447 as against 48,000 for the same period in 1922.

¹ First six months of 1922.

During the year 1922 the miners worked an average of 132 days. It can be shown that had they worked a possible 290 days, a volume for the state in excess of 91,200,000 tons could have been secured, and with it third place in rank as a coal producing state in the United States. With internal manufacturing development and industrial growth, this day will come in due course to Kentucky. For the past year a large number of wagon mines made an important aggregate contribution to the total volume of coal produced in the state. In normal times the most of these mines would be forced to close down though those best equipped might operate for an extended period.



A CAR OF BLUE GEM COAL

While the Blue Gem is a very superior coal particularly for domestic purposes, it rarely forms the basis of a very large operation. This view is on Horse Creek in Clay County, Kentucky.

The total of 41,917,321 tons of coal produced in 1922 is an increase of 11,634,626 tons or 38% over the total 1921 production of 30,282,695 tons. In 1922, 731 mines employed 58,909 men as compared to 49,790 men in 641 mines in 1921. The increase in men employed during the past year as compared to 1921 was 9,119 or 18.21%. A study of the movement of the coal produced in 1922 shows that the eastern Kentucky coals compete favorably with those of Pennsylvania, Ohio and West Virginia;

while those of western Kentucky find their competition with those produced in Illinois, Indiana and the south. In 1918 over 2,000,00 tons of coal were moved from eastern Kentucky directly to Lake Erie for barge distribution in the northwest.

COAL PRODUCTION BY DISTRICTS*

The production of coal by districts for the first six months of 1923¹ (January to June inclusive) follows:

FIRST DISTRICT.

Counties.	Tons.	County Rank
Webster	567,777	10
Hopkins	967,819	9
Christian	43,397	24
Henderson	172,307	16
Union	1,071,529	7
Totals	2,822,829	

SECOND DISTRICT.

Counties.	Tons.	County Rank
Daviess	66,103	21
McLean	39,890	25
Ohio	397,949	11
Muhlenberg	1,607,348	3
Hancock (no mines reporting)		31
Totals	2,111,290	

THIRD DISTRICT.

Counties.	Tons.	County Rank
Boyd	58,855	22
Morgan	20,197	27
McCreary	322,307	13
Lee	9,119	28
Laurel	20,587	26
Carter	53,218	23
Clay	87,403	20
Breathitt	94,927	19
Magoffin	8,521	29
Totals	675,134	

¹L. Blenkinsopp, First semi-annual report 1923. State Inspector of Mines, Lexington, Kentucky.

* For late release, coal production statistics for Kentucky prepared by U. S. Geol. Survey, year 1923, see Appendix C., p. 159.

FOURTH DISTRICT.

Counties.	Tons.	County Rank
Whitley	236,089	14
Knox	225,250	15
Bell	998,614	8
Totals	1,459,944	

FIFTH DISTRICT.

Counties.	Tons.	County Rank
Harlan	3,888,472	1

SIXTH DISTRICT.

Counties.	Tons.	County Rank
Letcher	1,506,920	5
Knott	160,506	17
Perry	1,537,230	4
Totals	3,204,656	

SEVENTH DISTRICT.

Counties.	Tons.	County Rank
Floyd	1,241,823	6
Johnson	334,761	12
Lawrence	5,167	30
Totals	1,581,751	

EIGHTH DISTRICT.

Counties.	Tons.	County Rank
Martin	152,406	18
Pike	2,528,117	2
Totals	2,680,523	

COALS PRODUCED BY FIELDS JANUARY TO JUNE INCLUSIVE,
1923

Eastern Kentucky, 21 Counties	13,490,480.00 tons
Western Kentucky, 10 Counties	4,934,119.00 tons

Total Kentucky production (Jan. to June, 1923) 18,424,599.00 tons

PRODUCTION OF COAL IN KENTUCKY* 1828 TO 1922.

Year	No. Short tons	Year	No. Short tons
1828	328	1879	1,000,000
1829	2,000	1880	1,000,000
1830	2,000	1881	1,232,000
1831	2,100	1882	1,300,000
1832	2,500	1883	1,650,000
1833	2,750	1884	1,550,000
1834	5,000	1885	1,600,000
1835	6,000	1886	1,550,000
1836	8,000	1887	1,933,185
1837	10,000	1888	2,570,000
1838	11,500	1889	2,399,755
1839	16,000	1890	2,701,496
1840	23,527	1891	2,916,069
1841	35,000	1892	3,025,303
1842	50,000	1893	3,007,179
1843	60,000	1894	3,111,192
1844	75,000	1895	3,357,770
1845	100,000	1896	3,333,478
1846	115,000	1897	3,602,097
1847	120,000	1898	3,887,908
1848	125,000	1899	4,607,255
1849	140,000	1900	5,328,964
1850	150,000	1901	5,469,986
1851	160,000	1902	6,766,984
1852	175,000	1903	7,538,032
1853	180,000	1904	7,576,482
1854	190,000	1905	8,432,523
1855	200,000	1906	9,653,647
1856	215,000	1907	10,753,124
1857	240,000	1908	10,246,533
1858	250,000	1909	10,697,384
1859	275,000	1910	14,623,319
1860	285,760	1911	14,049,703
1861	280,000	1912	16,490,521
1862	275,000	1913	19,616,600

*Production of Coal in Kentucky, W. R. Jillson, Kentucky Geological Survey, Series V, Bull. IV, pp. 160-162.

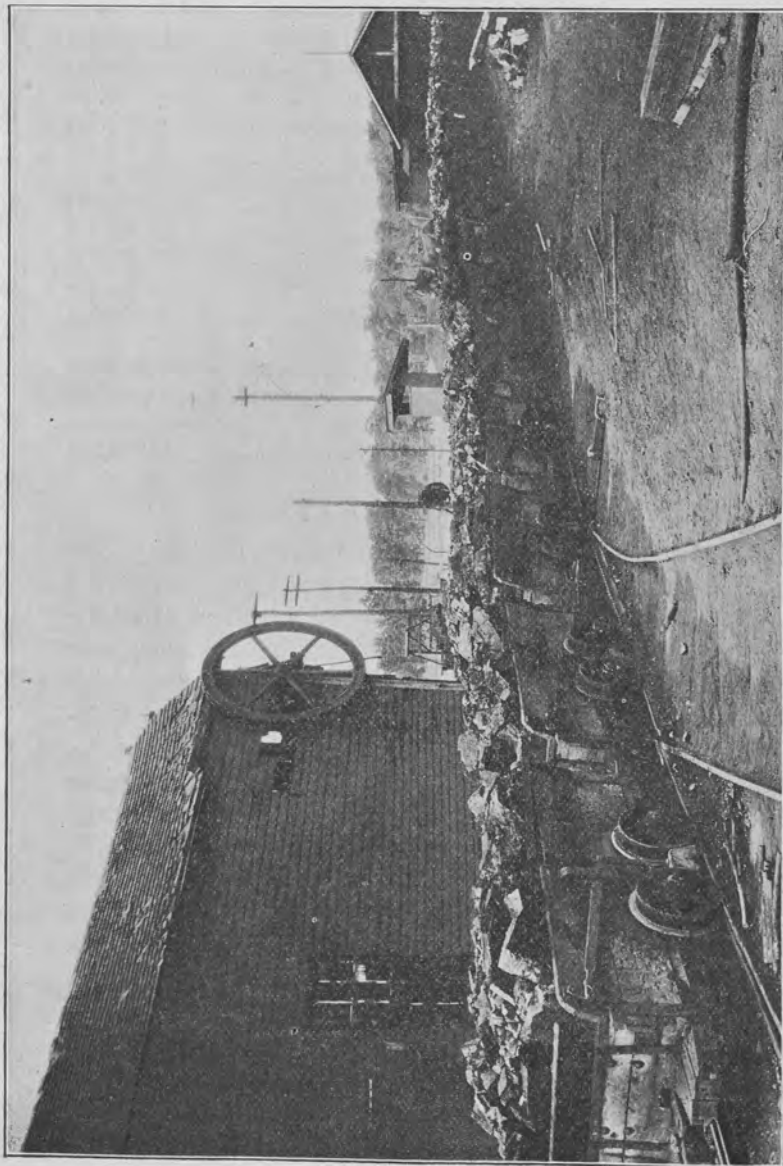
Year	No. Short tons	Year	No. Short tons
1863	250,000	1914	20,382,763
1864	250,000	1915	21,361,674
1865	200,000	1916	25,393,997
1866	180,000	1917	27,809,976
1867	175,000	1918	31,530,442
1868	160,000	1919	30,036,061
1869	160,000	1920	38,892,044
1870	150,582	1921	31,588,270
1871	250,000	1922	42,134,175
1872	380,800		
1873	400,000	1828-1922	476,058,026
1874	360,000		
1875	500,000	1915-1922 inclusive	248,846,639
1876	650,000	1828-1914 inclusive..	227,211,387
1877	850,000		
1878	900,000	Excess	21,635,252

208,182,336

KENTUCKY A NATIONAL COAL PRODUCER.

Rising from a position of comparative obscurity as a coal producer, Kentucky in 1898 and 1899 took tenth place among the states of the United States and contributed 1.8 per cent of the total coal production of the country.* In 1905, Kentucky rose to eighth from the top in the list of coal producing states, which position was maintained through 1907, when she headed Colorado, which had preceded her until then, and became seventh. In 1912 the rapid development of eastern Kentucky began to be felt and this state took fifth place, which was held through 1913. In 1914, with only Pennsylvania, West Virginia and Illinois ahead in the order named, Kentucky became the state of fourth importance on a coal producing basis. Ohio bid closely for the great northwest markets and her own, and slipped back into fourth place in 1915, relegating Kentucky to an easy fifth, which has been held through 1921. Due to general strike and other conditions which obtained outside the state in 1922, Kentucky coal production rose rapidly to a grand total of 41,917,321 tons, which again gave her fourth place as a national coal producer. For a few months during the early part of 1922, while other competing coal producing states were largely shut down by labor troubles, Kentucky stood first in the United States.

*Min. Res. U. S. G. S. 1900, pp. 298, 299.



LOADED MINE CARS

A characteristic view in the Western coal field. These mine cars are enroute from the mine to the tippie. They are loaded with St. Bernard No. 9 coal. This operation is now controlled by the West Kentucky Coal Corporation.

KENTUCKY COAL PRODUCTION AND VALUATION 1914-1923

1914—20,382,763 Tons; Value \$20,852,463.00.
1915—21,361,674 Tons; Value \$21,494,008.00.
1916—25,393,997 Tons; Value \$30,193,047.00.
1917—27,809,976 Tons; Value \$60,297,653.00.
1918—31,530,442 Tons; Value \$94,591,326.00.
1919—30,036,061 Tons; Value \$73,891,049.00.
1920—38,892,044 Tons; Value \$159,457,380.00.
1921—31,588,270 Tons; Value \$85,092,600.00*.
1922—42,134,175 Tons; Value \$127,037,000.00*.
1923—43,149,962 Tons; Value \$113,542,000.00*.

RECAPITULATION AND SUMMARY.

Kentucky has seen a wonderful advance in coal production during the past three decades. The state has risen from the bottom of the list in the middle '80's to fifth place in 1921. Prior to 1893 practically all the coal mining was done by hand and with the pick. About this time operators began to gradually introduce the use of machinery. This movement has grown rapidly, especially during the past three decades. In 1893, 20% of Kentucky coal was machine mined; in 1903, 49% was machine mined, and in 1913, approximately 70% was machine mined. In 1916 this had increased to 84.4%, and is about 90% at the present. The remarkable growth Kentucky has made in coal production during the last decade has been due to the discovery and development of new, thick, marketable coals in the eastern counties. Thus Letcher County enters the list of counties as producing commercial coal in 1912, and in 1916 heads the list, outrivaling her sister county, Pike, the then leader, which began producing commercial coal in 1904. Thrilled by the advance of Letcher, Pike County returns to the first place in 1917, and has led the state down to the present.

Harlan County has seen a similar development. Kentucky's output of coke was trebled the second year Harlan County produced commercial coal. The third year after Harlan County entered the list, the coke production was increased almost ten-fold. The western field has increased its production greatly by the consolidation of operations and the comparatively recent introduction of modern methods of stripping shallow coals with the steam shovel. The war demand stimulated coal production great-

*U. S. G. S. Min. Res. 1923, p. 35A. 1924.

ly in Kentucky. A reversion to normal conditions bids fair to maintain the figure, and the end is not yet in sight. The number of tons of coal produced per death in this state has been unusually high when compared with that of other coal producing states. This, while lamentable, can be corrected by proper care and rigid inspection. The number of strikes in the coal fields of Kentucky has been notably low, indicating in general, not only good labor conditions, but also conditions of good and farseeing management. During the recent general strike which almost completely paralyzed the coal producing industry throughout the United States and resulted in a Congressional Commission, the mines in Kentucky were kept in full operation in an attempt to meet the nation's demand for industrial and domestic coal. To the excellent operating factors thus indicated must be added the vast quantity of high grade coal not only unmined but still largely unopened and unsurveyed. These conditions, when taken together, reasonably assure Kentucky's future as a great national bituminous coal producer.



CHAPTER VIII THE EASTERN COAL FIELD

In eastern Kentucky there are twenty counties actively producing industrial and domestic coal. Distributed among these counties there were in 1921 out of a total of seven hundred and twenty-three mines in the entire state, five hundred and seventy-four operations. All of these eastern Kentucky mines with two or three exceptions now make use of railroad transportation. The Big Sandy valley is served by the Chesapeake and Ohio railroad, and the Carolina, Clinchfield and Ohio railroad. The Kentucky river district is served by the Louisville and Nashville railroad. Coal mined in the Cumberland valley is transported by the Southern (Cincinnati, New Orleans and Texas Pacific) railroad and the Louisville and Nashville railroad. Of the twenty coal producing counties, Bell heads the list with eighty-five operations, and Pulaski is at the bottom with but one mine.

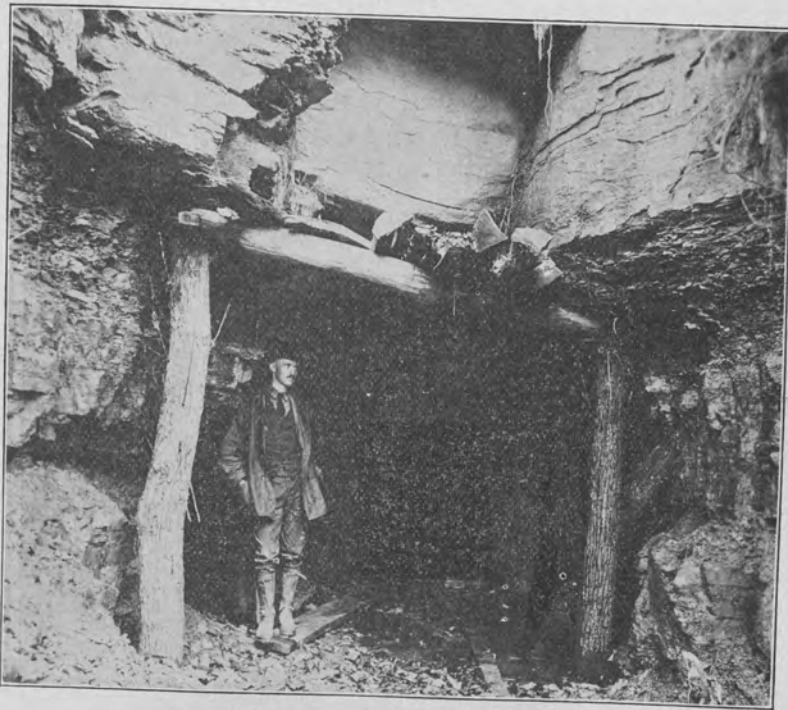


A BIG SANDY COAL MINE

This operation, owned by the North East Coal Co., is located at Auxier in Floyd County, Kentucky. The Van Lear seam is opened at the extreme left, tippel shown at the right.

Only during the last decade has eastern Kentucky become a coal field of national importance. It is now a far-flung battleground of old traditions and new ideas. The old-time, quiet,

picturesque mountain and hill land regions are rapidly becoming more and more restricted in area. Everywhere may be noted the advance of new railroad grades, the construction of new coal mining operations, and the growth of new industrial cities. The next decade or two will mark the further development of this richly mineralized region, while yearly leadership in number of tons of coal produced in the state goes the rounds of the headwaters of the Big Sandy, the Kentucky and the Cumberland rivers.



A HAZARD FIELD OPENING

This is an entry of the Hazard-Star Coal Corporation located at Charles on the Kentucky River in northern Perry County, Kentucky. The Flag coal (No. 7) is operated.

The counties ranked for the eastern Kentucky field according to the number of operations active in each as in 1920, follow:

County	Number of Operations	Field Rank	County	Number of Operations	Field Rank
Bell	85	1	Laurel	13	13
Boyd	6	15	Lawrence	4	16
Breathitt	20	9	Lee	2	18
Carter	9	14	Letcher	45	6
Clay	18	10	McCreary	14	12
Floyd	62	4	Morgan	2	19
Harlan	72	3	Perry	61	5
Johnson	16	11	Pike	78	2
Knott	3	17	Pulaski	1	20
Knox	32	7	Whitley	30	8

Total number of mines in Eastern Kentucky, 574.

A list of the separate coal operations in the eastern Kentucky coal field has been prepared as the result of new and original field investigations made by the Kentucky Geological Survey during 1920. The name of the coal mine as well as other pertinent data was secured directly from the operator on the ground, insufficient time and funds being available to make the determination in any other way. Following an exact correlation of all of the eastern Kentucky coals, a broad piece of work that is now very much needed in this state, it is very probable that many of these operated coals will need revision of their nomenclature. The list follows, the counties being arranged in alphabetical order:

EASTERN KENTUCKY COAL FIELD.

BELL COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
1. Federal Coal Co. (Glendon Mine).....Arjay	Straight Crk...	1-B	400
2. New Arjay Coal Co.....Arjay	Straight Crk...	1-B	150
3. Wagner Coal Co.....Arjay	Klondike		
4. Roth Coal Co.....Arjay	Straight Crk...	2-B	100
5. Culton, Yeager & Katen Coal Co.....Arjay	Straight Crk...	1-B	1,200
6. Southern Mining Co.....Balkan	Rim	1-B	100
7. New Belljellico Coal Co.....Belljellico	Creech	1-B	1,300
	Upper Dean		
8. Coleman Mining Co.....Blanche	Lower Dean	2-B	400
9. Bailey Coal Co.....Blanche	Straight Crk...	1-B	300
(Under construction)	Straight Crk...	1-B	100
10. Columbia Coal Co.....Bosworth	Jackrock	1-B	250
11. Yellow Creek Coal Co.....Bosworth	Jackrock	1-B	800
12. East Point Coal Co.....Bosworth	Winona	1-B	100
13. Winona Coal & Coke Co.....Bosworth	Winona	1-B	500
14. Gravity Coal Co.....Bosworth	Winona	1-P	50
15. Bellman Coal Co.....Bosworth	Winona	1-B	200
16. Lewis Coal Co.....Calloway	Mason	1-B	50
17. Kresge Mining Co.....Calloway	Mason	1-B	50
18. Mathel Coal & Mining Co.....Calloway	Harlan	1-B	200
19. Cardinal Coal Co.....Cardinal	Harlan	1-B	300
20. Cain Coal Co., No. 1.....Cary	Straight Crk...	1-B	100
21. Cain Coal Co., No. 2.....Cary	Straight Crk...	1-B	25
22. Federal Coal Co. (Costro Mine).....Cary	Straight Crk...	1-B	100
23. Federal Coal Co. (Cary Mine).....Cary	Straight Crk...	1-B	350
24. Chenoa Hignite Coal Co.....Chenoa	Lower Hignite	1-B	400
25. Crane Creek Coal Co.....Colmar	Mason	1-B	250
26. Southern Mining Co.....Colmar	Mason	1-B	500
27. Log Mountain Coal Co.....Davisburg	Mason	1-B	350
28. Log Mountain Coal Co., No. 2.....Davisburg	Poplar Lick	1-B	200
29. Kentucky Collieries Co., No. 4.....Pineville	Straight Crk...	1-B	400
30. Kentucky Collieries Co., No. 2.....Pineville	Straight Crk...	1-B	150
31. New Straight Creek Coal Co.....Pineville	Straight Crk...	1-B	125
32. Pioneer Coal & Coke Co.....Kettle Island	Straight Crk...	1-B	1,000
33. Conant Coal Co.....Pineville	Straight Crk...	1-B	200
34. Boone Trail Coal Co.....Straight Creek	Straight Crk...	1-B	200
35. Liberty Coal & Coke Co.....Straight Creek	Straight Crk...	1-B	700
36. Liberty Coal & Coke Co., No. 4.....Straight Creek	Straight Crk...	1-B	400
37. Kentucky Straight Creek Coal Co.....Straight Creek	Straight Crk...	1-B	250
38. Liberty Coal & Coke Co. (Harris Mine).....Straight Creek	Harris	1-B	50
39. R. H. Barker Coal Co.....Straight Creek	Harris		
	Straight Crk...	2-B	100
40. Kentucky Collieries Co.....Hulen	Rocky Branch	1-B	100
41. Harlan Carter Coal Co.....Hulen	Rocky Branch	1-B	50
42. Burnwell Coal Co.....Hulen	Rocky Branch	1-B	50
43. Rocky Branch Coal Co.....Hulen	Rocky Branch	1-B	150
44. Long Ridge Coal Co.....Hulen	Mason	1-B	250
45. Layman Calloway Coal Co.....Hulen	Mason	1-B	100
46. Brownings Creek Coal Co.....Pineville	Mason	1-B	100
47. Varilla Mining Co.....Varilla	Harlan	1-B	200
48. Blue Ridge Coal Co.....Pineville	Mason	1-B	50
49. Ponza Coal Co.....Pineville	Mason	1-B	50
50. Ferndale Coal & Coke Co.....Middlesboro	Barner	1-B	50
51. Fidelity Coal Mining Co.....Middlesboro	Barner	1-E	350
52. Victor Coal Mining Co.....Meldrum	Barner	1-B	150
53. Low Ash Mining Co.....Middlesboro	Barner	1-B	300

Bituminous indicated by B, Splint by S, Bituminous and Cannel by B&C.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
54. Yellow Hill Mining Co.....Middlesboro	Big Rock	1-B	100
55. Stewart Coal Co.....Wasiota	Straight Crk...	1-B	25
56. Wilhor Coal Co.....Middlesboro	Straight Crk...	1-B	100
57. Arcadia Coal Co.....Wallsend	Straight Crk...	1-B	200
58. Home Run Coal Co.....Middlesboro	Turner	1-B	150
59. Fern Lake Coal Co.....Middlesboro	Winona	1-B	100
60. Turner Coal Co.....Middlesboro	Turner	1-B	100
61. Climax Coal Co.....Shamrock	Sterling	2-B	400
62. Congress Coal Mining Co.....Shamrock	Jackrock	1-B	250
63. Dixie Gem Coal Co.....Middlesboro	Mason	1-B	150
64. Clover Leaf Coal Co.....Middlesboro	Jackrock	1-B	200
65. Long Branch Coal Co.....Middlesboro	Jackrock	1-B	150
66. Hawley Coal Co.....Middlesboro	Jackrock	1-B	300
67. Hignite Coal Mining Co.....Shamrock	Lower Hignite	1-B	450
68. Monarch Coal & Coke Co.....Middlesboro	Jackrock		
	Lower Hignite	2-B	250
69. Coal Creek Co.....Ralston	Poplar Lick	1-B	150
70. Atlas Coal Mining Co.....Ralston	Hignite	1-B	300
71. Pinnacle Coal Co.....Ralston	Poplar Lick	1-E	300
72. Crystal Coal Co.....Logmont	Hignite		
	Poplar Lick	2-B	300
73. Lower Hignite Coal Co.....Logmont	Hignite		
	Poplar Lick	2-B	350
74. Log Mountain Coal Co.....Harrison	Poplar Lick	1-B	350
75. Utility Gas Coal Co.....Fourmile	Straight Crk...	1-B	200
76. New Raven Mining Co.....Fourmile	Straight Crk...	1-B	50
77. Indian Creek Coal Co.....Fourmile	Straight Crk...	2-B	200
	Rim	1-B	400
78. J. B. Straight Creek Mining Co.....Fourmile	Rim	1-E	175
79. Cub Bear Mining Co.....Tinsley	Lower Dean	1-B	450
80. Jay Bee Coal Co.....Tinsley	Upper Dean	1-B	150
81. Pine Ridge Coal Mining Co.....Tinsley	Upper Dean		
82. J. B. Blue Gem Coal Co., No. 1.....Hosman	Upper Dean		
	Lower Dean	2-B	350
83. Price Jellico Coal Co.....Middlesboro	Black Raven	1-B	50
84. Paige Jellico Coal Co.....Elys	Jellico	1-B	600
85. Kanawha Coal Co.....Elys	Jellico	1-B	500

BOYD COUNTY

86. Ashland Iron & Mining Co., No. 8.....Ashland	No. 6	1-B	75
87. Ashland Iron & Mining Co.....Ashland	No. 7	1-B	150
88. F. H. Clero, Ashland Iron & Mining Co.....Coalton	No. 7	1-B	25
89. Big Run Coal Co.....Princess	No. 7	1-B	400
90. Princess Coal Co.....Princess	No. 7	1-B	50
91. Corbin Mining Co.....Princess	No. 7		
	No. 6	2-B	35

BREATHITT COUNTY

92. Perry Bell Coal Co.....Barwick	No. 4 Rider	1-B	50
93. Barwick Coal Co.....Barwick	No. 4 Rider	1-B	150
94. Wolf Creek Coal Co.....Wolfcoal	No. 4	1-E	50
95. Friend Kash Coal Co.....Whick	No. 7	1-B&C	50
96. Lick Branch Coal Co.....Saldee	No. 4	1-B	150
97. J. B. Jewell Coal Co.....Saldee	No. 4	1-B	200
98. Gambill Coal Co.....Saldee	No. 4	1-B	110
99. Mowbray Robinson Co.....Quicksand	No. 7	1-B	80
100. Jackson Block Coal Co.....Jackson	Elkhorn(?)	1-B	250
101. Panhandle Coal Co.....Jackson	No. 4	1-B	150
102. Davis Coal Co.....Jackson	No. 4	1-B	250
103. Jones Bros. Coal Co.....Jackson	No. 3	1-B	100
104. Cane Jones Coal Co.....Jackson	No. 3	1-B	100

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind Coal Seams Operated	Mine Capacity in Tons	
105. Riverside Coal Co.	Gunn	No. 4	1-B	150
106. Ky. River Mining Co.	Frozen	No. 4	1-B	100
107. Smith Bros. Coal Co.	Frozen	No. 4	1-B	25
108. J. C. Spencer Coal Co.	Frozen	No. 4	1-B	25
109. Spencer Coal Co.	Frozen	No. 4	1-B	25
110. Progressive Coal Co.	Calla	No. 4	1-B	50
111. Bear Creek Coal Co.	Simpson	No. 4	1-B	100

CARTER COUNTY

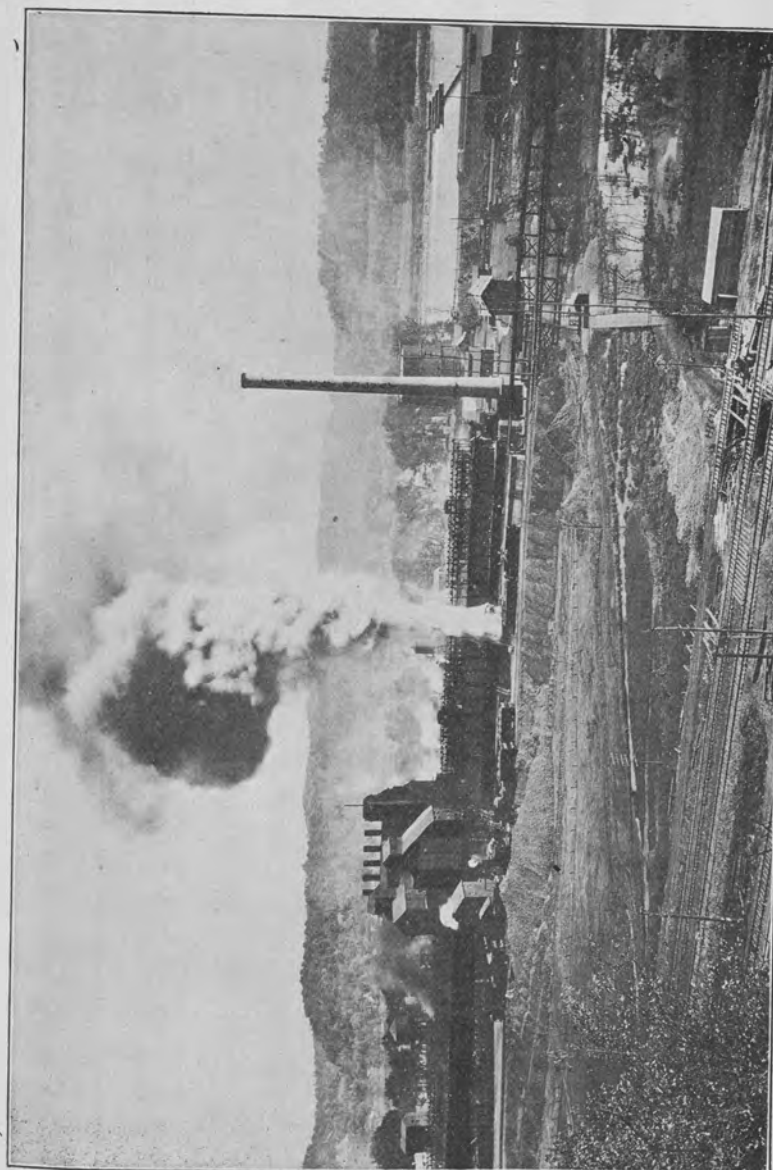
112. Straight Creek Coal Co.	Denton	No. 7	1-B	150
113. Ky. Gem Coal Co.	Rush	No. 8	1-S&B	150
114. Midland Coal Co.	Kilgore	No. 7	1-B	75
115. Lick Creek Coal Co.	Bells Trace	No. 7	1-B	25
116. Dry Fork Coal Co.	Bells Trace	No. 7	1-B	65
117. N. Their Coal Co.	Partlow	No. 7	1-B	100
118. Willard Coal Co.	Willard	No. 7	1-B	75
119. Little Fork Coal Co.	Willard	No. 5	1-B	65
120. Johns Runs Coal Co.	Grayson	No. 5	1-B	150

CLAY COUNTY

121. Furnace Gap Coal Co.	Hima	Horse Creek	1-B	100
122. Horse Creek Coal Co.	Hima	Horse Creek	1-B	100
123. Hensley Coal Co.	Hima	Horse Creek	1-B	100
124. Sunshine Coal Co.	Hima	Horse Creek	1-B	125
125. White, Truett Coal Co.	Hima	Horse Creek	1-B	50
126. Sun Coal Co.	Hima	Horse Creek	1-B	100
127. Mays and Gray's Coal Co.	Hima	Horse Creek	1-B	25
128. Grace and Gray's Coal Co.	Hima	Horse Creek	1-B	25
129. Gregory Branch Coal Co.	Hima	Horse Creek	1-B	100
130. Hughes Horse Creek Coal Co.	Hima	Horse Creek	1-B	50
131. King Blue Gem Coal Co.	Hima	Horse Creek	1-B	50
132. Clay County Coal Co.	Hima	Horse Creek	1-B	200
133. Cumberland & Manchester Coal Co.	Hima	Horse Creek	1-B	50
134. Jackson Coal & Coke Co.	Hima	Horse Creek	1-B	50
135. Panama Coal Co.	Manchester	Manchester	1-B	250
136. Winkler & Miller Coal Co.	Manchester	Manchester	1-B	40
137. E. Y. Little Coal Co.	Manchester	Manchester	1-B	40
138. B. P. White Coal Co.	Garrard	White	1-B	75

FLOYD COUNTY

139. Northeast Coal Co.	Auxier	No. 1	1-B	750
140. Cliff Coal Co.	Cliff	No. 1	1-B	200



THE KENTUCKY SOLVAY COMPANY
This important industrial enterprise situated at the mouth of the Big Sandy River near Catlettsburg, is a large consumer of by-products coal produced in the southeastern Kentucky field.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
141. Purity Cannel Coal Co. Cliff	No. 2	2-B&C	140
142. Blue Beaver Coal Co. Prestonsburg	No. 1	2-B	150
	No. 4	1-B	500
143. Middle Creek Coal Co. Prestonsburg	No. 1	1-B	140
144. Prestonsburg Coal Co. Prestonsburg	No. 1	1-B	400
145. Colonial Coal & Coke Co. Prestonsburg	No. 1	1-B	80
146. Anchor Coal Co. Prestonsburg	No. 1	1-B	150
147. Cow Creek Coal Co. Emma	No. 1	1-B	100
148. Waldon Coal Co. Emma	No. 1	1-B	150
149. Martha Leslie Coal Co. Emma	No. 1	1-B	125
150. Dwale Coal Co. Allen	Elkhorn No. 1	1-B	125
151. Virginia Mining Co. Allen	No. 1	1-B	350
152. Elkhorn Coal Corp. Wayland	Elkhorn	1-E	400
153. Elkhorn Coal Corp. Wayland	Elkhorn	1-B	150
154. Elkhorn Coal Corp. Wayland	Elkhorn	1-B	100
155. Wells Elkhorn Coal Co., No. 1. Estill	Elkhorn	1-B	200
156. Wells Elkhorn Black Diamond Coal Co. Estill	Elkhorn	1-B	200
157. Wells Elkhorn Coal Co., No. 4. Estill	Elkhorn	1-B	150
158. Lackey Mining Co. Lackey	Elkhorn	1-B	200
159. Collins Mining Co. Lackey	Elkhorn	1-B	250
160. Stov. r Elkhorn Coal Co. Lackey	Elkhorn	1-B&C	150
161. Zella Mining Co. Lackey	Elkhorn	1-B&C	400
162. Standard Elkhorn Coal Co. Garrett	Elkhorn	1-B	100
163. Elkhorn Coal Corp., No. 325. Garrett	Elkhorn	1-B	150
164. Elkhorn Coal Corp., No. 327. Garrett	Elkhorn	1-B	100
165. Goodwin & Barney Coal Co. Garrett	Elkhorn	1-B	150
166. Superior Elkhorn Coal Co. Hueysville	Elkhorn	1-B	75
167. Northern Elkhorn Coal Co. Northern	Elkhorn No. 2	2-B	150
168. Bucks Branch Coal Co. Smalley	Elkhorn No. 1	2-B	100
	Mid. Elkhorn	1-E	85
169. Nalone Elkhorn Coal Co. Allen	Elkhorn No. 3	1-B	100
170. Ky. Beaver Collieries Co. Allen	Big Vein	1-B	75
171. Regal Block Coal Co. Ivel	Elkhorn	1-B	250
	No. 1 (?)	1-B	6,000
172. St. Paul Coal Co. Betsey Layne	No. 1	1-B	100
173. Big Elkhorn Coal Co. Betsey Layne	Low. Elkhorn	1-B	50
174. Pike Floyd Coal Co. Betsy Layne	No. 3	1-B	100
(Under construction)			
175. Layne Coal Mining Co. Harold	Van Lear	1-B	100
176. Harold Coal & Coke Co. Harold	Winifred	2-B	100
177. Samoset Fuel Corp. Smalley	Low. Elkhorn	2-B	100
	Elkhorn No. 3	2-B	150
178. Pivot Rock Coal Co. Smalley	Elkhorn No. 1	2-B	75
	Elkhorn No. 3	1-B	100
179. Ky. Block Fuel Co., No. 1. Smalley	Elkhorn No. 1	1-B	100
180. Beaver Creek Coal Co. Alphoretta	Elkhorn No. 1	1-E	100
181. Printer Elkhorn Coal Co. Printer	Elkhorn No. 2	1-B	175
182. Long Branch Coal Co. Drift	Elkhorn No. 2	1-B	100
183. J. N. Meek Coal Co. Drift	No. 2	2-B	150
184. Floyd Elkhorn Consolidated Collieries, No. 2. Drift	No. 2	1-B	250
185. Floyd Elkhorn Consolidated Collieries, No. 1. Drift	No. 2	1-B	350
186. Elkhorn Coal Corp., No. 331. Wayland	Elkhorn	1-B	150
187. Edgemont Fuel Co. Minnie	Edgemont Top	2-B	100
	Edgem't Bot.	2-B	150
188. Elkhorn Star Coal Co., No. 1. Minnie	Elkhorn No. 3	2-B	100
189. Elkhorn Star Coal Co., No. 2. Minnie	Elkhorn No. 2	2-B	150
	Elkhorn No. 3	2-B	250
190. Royal Elkhorn Coal Co. McDowell	Elkhorn No. 1	1-B	100
191. Liberty Coal Corp. McDowell	Upper Elkhorn	1-B	
	No. 2	1-B	

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
192. Elkhorn Block Coal Co. Orkney	No. 3	2-B	100
193. Blue Beaver Elkhorn Fuel Co. Ligon	Elkhorn	1-B	200
194. Cumberland Coal & Coke Co. Melvin	Elkhorn No. 1	1-B	200
195. Loraine Elkhorn Coal Co. Melvin	Elkhorn No. 1	1-B	200
196. Elkhorn Piney Coal Mining Co., No. 123. Weeksbury	Elkhorn No. 3	1-B	650
197. Elkhorn Piney Coal Mining Co., No. 457. Weeksbury	Elkhorn No. 3	1-B	350
198. Elkhorn Coal Corp. Wheelwright	Elkhorn No. 3	1-B	450
199. Elkhorn Collieries Co. Bevinsville	Elkhorn No. 3	1-B	125
200. Beaver Elkhorn Coal Co. Bevinsville	Elkhorn No. 3	1-B	100

HARLAN COUNTY

201. United States Coal & Coke Co. Lynch	Elkhorn C	1-B	16,000
202. Wisconsin Steel Co., No. 1. Benham	Elkhorn C	1-B	2,500
203. Wisconsin Steel Co., No. 2. Benham	Elkhorn C	1-B	1,500
204. Looney Creek Coal Mining Co. Benham	Elkhorn C	1-B	150
205. Kellioka Coal Co. Nolandsburs	Kellioka	1-B	250
206. Ky. Harlan Coal Co. Harlan	Harlan	1-B	300
207. Harlan Gas Coal Co. Harlan	Harlan	1-B	1,000
208. Kitts Creek Coal Co. Harlan	Harlan	1-B	200
209. Rex Coal Co. Kitts	Harlan	1-B	600
210. Clover Fork Coal Co. Kitts	Harlan	1-B	800
211. Golden Ash Coal Co. Kitts	Harlan	1-B	200
212. J. B. Blue Gem Coal Co., No. 2. Blackjoe	Harlan	1-B	400
213. Melcroft Coal Co. (Coxton Mine). Coxton	Harlan	1-B	800
214. Melcroft Coal Co. (Kayu Mine). Coxton	Harlan	1-E	500
215. Harlan Collieries Co. Ages	Harlan	1-B	1,200
216. Harlan Gem Coal Co. Ages	Harlan	1-B	100
217. East Harlan Coal Co. Ages	Harlan	1-B	400
218. W. D. Boyer, Trustee, & Co. Verda	Harlan	1-B	800
219. King Harlan Co. Kilday	Harlan	1-B	500
220. J. L. Smith Coal Co. Kilday	Harlan	1-B	500
221. Sugar Camp Mining Co. Everts	Harlan	1-B	100
222. Middleton Coal Co. Everts	Harlan	1-B	150
223. Nape Fuel Co. Everts	Harlan	1-B	100
224. Harlan Co-operative Coal Co. Everts	Harlan	1-B	100
225. Black Mountain Coal Co. Dizney	Harlan	1-B	1,000
226. Everts Coal Co. Everts	Kellioka	2-B	200
	Harlan	1-B	450
227. Rye Hollow Coal Co. Everts	Harlan	1-B	50
228. Harlan Liberty Coal Co. Everts	Harlan	1-B	200
229. Bowling Mining Co. Everts	Harlan	1-B	300
230. Superior Harlan Coal Co. Everts	Harlan	2-B	200
	Kellioka	1-B	200
231. R. L. Brown Coal & Coke Co. Everts	Kellioka	1-B	200
232. Harlan-Kellioka Coal Co. Everts	Kellioka	1-B	25
233. Block Coal Co. Everts	Harlan	1-B	250
234. Brown & Sharpe Coal Co. Lejunior	Harlan	1-B	150
235. Cook & Sharpe Coal Co. Lejunior	Harlan	1-B	150
236. Home Coal Co. Lejunior	Harlan	1-B	250
237. Berger Coal Co. Lejunior	Harlan	1-B	150
238. Model Coal Co. Lejunior	Harlan	1-B	100
239. Coopers Ridge Coal Co. High Splint	Harlan	1-B	50
240. Harlan Coal & Coke Co. High Splint	Harlan	1-B	250
241. High Splint Coal Co. High Splint	Harlan	1-B	150
(Harlan Mine)			
242. High Splint Coal Co. High Splint	High Splint	1-B	2,000
(High Splint Mine)			
243. Wallins Creek Collieries Co. Harlan	Harlan	1-B	2,000
244. McCombs Coal Co. Elcomb	Harlan	1-B	2,000
245. Perkins-Harlan Coal Co. Liggett	Harlan	1-B	1,200
(Under construction)			

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
246. Harlan Fuel Co. (Under construction)	Harlan	1-B	5,000
247. R. C. Tway Coal Co.	Harlan	1-B	1,000
248. Shawnee Fuel Co.	Harlan	1-B	500
249. Wilson-Berger Coal Co. (Mill Creek)	Grays Knob	Wallins Smith	
250. Wilson-Berger Coal Co. (Grays Branch)	Grays Knob	Wallins Smith	1,000
251. Harlan Superior Coal Co.	Chevorlet	Harlan	1,000
252. Williams By-Product Coal Co.	Chevorlet	Harlan	50
253. Lena Rue Coal Co.	Lena Rue	Harlan	2,000
254. Mary Helen Coal Corp.	Coalgood	Harlan	1-B
255. White Star Coal Co. (No. 1 and No. 2)	White Star	Wallins	1,500
256. White Star Coal Co., No. 3	White Star	Harlan	2-B
257. White Star Coal Co., No. 5	White Star	Harlan	1-B
258. Riverside Coal Mining Co.	White Star	Mason	
259. Vinson & Cobb Coal Co.	Cargo	Jellico (?)	1-B
260. Wheeler-Boone Coal Co.	Wallins Creek	No. 5	1-B&C
261. Canbit Coal Co.	Wallins Creek	Cumberland	150
262. Platts Fork Coal Co.	Wallins Creek	Cannel	1-B&C
263. Wallins Creek Coal Co.	Wallins Creek	Cumberland	100
264. Banner Fork Coal Co., No. 1	Kentonia	Wallins	1-B
265. Ky. King Coal Co.	Wallins Creek	Wallins	1-B
266. Banner Fork Coal Co., No. 2	Kentonia	Wallins	1-B
267. Creech Coal Co.	Twila	Wallins	1-B
268. China Coal Co.	Wallins Creek	Wallins	1,800
269. Harlan Blue Buck Coal Co.	Wallins Creek	Cumberland	
270. Munsin Coal Co.	Layman	Cannel	1-B&C
271. Schwenzer Mines	Molus	Blue Gem	1-B
272. Molus Coal Co.	Molus	Harlan	1-B

JOHNSON COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
273. Northeast Coal Co.	Whitehouse	No. Name (Prob. No. 1)	1-B
274. Royal Collieries Mine	Offutt	No. 1	1-B
275. Ayers Lang Coal Co.	Offutt	Chattarol	1-B&C
276. Greasy Creek Coal Co.	Offutt	No. 1	1-B
277. Northeast Coal Co., No. 2	Paintsville	No. 1	1-B
278. Northeast Coal Co., No. 3	Paintsville	No. 1	1-B
279. Greenrock Coal Co.	Riceville	No. 1	1-B
280. Denver Coal Co.	Denver	No. 1	1-B
281. High Grade Block Coal Co.	Denver	No. 2	1-B
282. Line Branch Coal Co.	Hagerhill	No. 1	1-B
283. Northeast Coal Co., No. 1	Paintsville	No. 1	1-B
284. Consolidation Coal Co., No. 5	Van Lear	No. 1	1-B
285. Consolidation Coal Co., No. 4	Van Lear	No. 1	1-B
286. Consolidation Coal Co., No. 3	Van Lear	No. 1	1-B
287. Consolidation Coal Co., No. 2	Van Lear	No. 1	1-B
288. Consolidation Coal Co., No. 1	Van Lear	No. 1	1-B

KNOTT COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
289. Wisconsin Coal Co. (Under construction)	Sassafras	No. 9	
290. Perkins-Bowling Coal Co. (Under construction)	Sassafras	No. 7	2-B
291. Knott Coal Co. (Under construction)	Sassafras	No. 9	2-B
		No. 7	2-E

KNOX COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
292. Sun Coal Co., No. 1	Flat Lick	Straight Crk.	1-B
293. Sun Coal Co., No. 2	Flat Lick	Straight Crk.	1-B
294. Ennis Coal Co.	Himyar	Straight Crk.	1-B
295. W. & L. Blue Gem Coal Co.	Artemus	Blue Gem	1-B
296. Jackson Coal Mining Co.	Artemus	Dean	1-B
297. Ky. Blue Gem Coal Co.	Artemus	Blue Gem	1-B
298. Florence May Coal Co.	Lay	Blue Gem	1-B
299. Alford Thomas Coal Co.	Lay	Blue Gem	1-B
300. Mark Coal Co.	Lay	Blue Gem	1-E
301. Charles Coal Co.	Lay	Dean	1-B
302. Charles Coal Co.	Lay	Dean	1-B
303. Power Coal Co.	Trosper	Dean	1-B
304. New Trosper Coal Co.	Trosper	Dean	1-B
305. Carter Coal Co.	Trosper	Dean	1-B
306. Carter Coal Co.	Warren	Dean	1-B
307. Tway Mining Co.	Anchor	Dean	1-B
308. Carter Coal Co.	Anchor	Dean	1-B
309. J. B. Blue Gem Coal Co.	Wheeler	Dean	1-B
310. Greasy Gap Coal Co.	Wheeler	Dean	1-B
311. Smith Riley Coal Co.	Barbourville		1-B
312. Richland Creek Coal Co.	Barbourville	Blue Gem	1-B
313. Stansbury Coal Co.	Barbourville	Blue Gem	1-B
314. Huron Coal Co.	Barbourville	Blue Gem	1-B
315. Pincey Blue Gem Coal Co.	Barbourville	Blue Gem	1-B
316. Trace Branch Coal Co.	Barbourville	Blue Gem	1-B
317. K. D. Blue Gem Coal Co.	Barbourville	Blue Gem	1-B
318. Maracle Blue Gem Coal Co.	Cannon	Blue Gem	1-B
319. Steel & Alder Coal Co.	Girdler	Blue Gem	1-B
320. Richland Coal Co.	Gray	Jellico	1-B
321. Turner Jellico Coal Co.	Gray	Jellico	1-B
322. Rossland Mining Co.	Gray	Jellico	1-B
323. Gordon, Miller Coal & Coke Co.	Gray	Jellico	1-B
324. North Jellico Coal Co.	Wilton	Jellico	1-B

LAUREL COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
325. France Jellico Coal Co.	Fariston	Blue Gem	1-B
326. McCarthy Coal Co.	East Bernstadt	Star	1-B
327. Thompson Coal Co.	East Bernstadt	Altamont	1-B
328. New Diamond Coal Co.	Altamont	Altamont	2-B
329. Pritchard Coal Co.	Altamont	Altamont	1-B
330. McDowell Coal Co.	East Bernstadt	Altamont	1-B
331. Horseshoe Coal Co.	East Bernstadt	Altamont	1-B
332. Beatty Coal Co.	East Bernstadt	Altamont	1-B
333. Standard Coal Co.	East Bernstadt	Altamont	1-B
334. Jewel Coal Co., No. 1	Pittsburg	Altamont	1-B
335. Jewel Coal Co., No. 2	Pittsburg	Altamont	1-B
336. Floyd Coal Co.	Viva	Altamont	1-B
337. Fernie Coal Co.	East Bernstadt	Altamont	1-B

LAWRENCE COUNTY

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Seams Operated	Mine Capacity in Tons
338. Torchlight Coal Co. Torchlight	Watson		
	McHenry	2-B	50
339. Torchlight Coal Co. Torchlight	Watson		
	McHenry	2-B	50
340. Crystal Block Coal Co. Richardson	Rock Branch	1-B	75
341. Peach Orchard Mines Peach Orchard	Peach Orchard	1-B	75

LEE COUNTY

342. The Frankfort Elevator Coal Co. Frankfort	No. 4	1-B	400
	Beattyville		
343. Ky. River Coal & Feed Co. Beattyville	No. 4	1-B	50

LETCHER COUNTY

344. Huntington By-Product Coal Co. Jenkins	Elkhorn	1-B	175
345. Elkhorn Collieries Co. Jenkins	Elkhorn	1-B	100
346. Consolidation Coal Corp., Mine 201. Jenkins	Elkhorn	1-B	1,200
347. Consolidation Coal Corp., Mine 202. Jenkins	Elkhorn	1-B	600
348. Consolidation Coal Corp., Mine 203. Jenkins	Elkhorn	1-B	1,200
349. Consolidation Coal Corp., Mine 204. Jenkins	Elkhorn	1-B	1,800
350. Consolidation Coal Corp., Mine 205. Jenkins	Elkhorn	1-B	1,500
351. Consolidation Coal Corp., Mine 206. Jenkins	Elkhorn	1-B	1,000
352. Consolidation Coal Corp., Mines 207, 208	Jenkins	1-B	1,800
353. Consolidation Coal Corp., Mines 210, 211, 212	Jenkins	1-B	1,800
354. Consolidation Coal Corp., Mine 213. Jenkins	Elkhorn	1-B	1,000
355. Consolidation Coal Corp., Mine 214. Jenkins	Elkhorn	1-B	18,000
356. Consolidation Coal Corp., Mine 215. Jenkins	Elkhorn	1-B	1,500
357. Elkhorn Coal Corp., Mines 301, 307. Fleming	Elkhorn	1-B	1,250
358. Elkhorn Coal Corp., Mine 302. Fleming	Elkhorn	1-B	500
359. Elkhorn Coal Corp., Mines 305, 306. Fleming	Elkhorn	1-B	900
360. Elkhorn Coal Corp., Mine 304. Fleming	Elkhorn	1-B	1,250
361. Elkhorn Coal Corp., Mine 303. Fleming	Elkhorn	1-B	750
362. Logan Elkhorn Coal Corp., No. 1. Fleming	Elkhorn	1-B	600
363. Acme By-Product Coal Co. Fleming	Elkhorn	1-B	250
364. Logan Elkhorn Coal Corp., No. 2. Seco	Elkhorn	1-B	300
365. Southeast Coal Co., No. 1. Seco	Elkhorn	1-B	1,000
366. Elkhorn Coal Co. Mater	Elkhorn	1-B	450
367. Southeast Coal Co., No. 2. Seco	Elkhorn	1-B	1,000
368. Elkhorn Junior Coal Co. Millstone	Elkhorn	1-B	300
369. Elkhorn Collieries Co., No. 2. Sergent	Elkhorn	1-B	1,000
370. Imperial Coal Co. Sergent	Elkhorn	1-B	300
371. Mayking Coal Corp. Mayking	Elkhorn	1-B	300
372. Elkhorn Hazard Coal Co. Whitesburg	No. 4		
	Whitesburg	2-B	300
373. Elkhorn Jellico Coal Co. Whitesburg	No. 4		
	Jellico	2-B	300
374. Solner Mining Co. Whitesburg	Elkhorn	1-B	200
375. Whitesburg Coal Co. Whitco	No. 4	1-B	300
376. Cowan Creek Coal Co. Ice	No. 4 Rider		
	No. 4	1-B	250
377. Barking Coal Co. Whitesburg	Amburgy	1-B	50
378. Consolidated Fuel Co., Jessie Mine. Dalna	Amburgy	1-B	600
379. Amburgy Coal Co. Dalna	Amburgy		
	No. 4	2-B	500
380. Consolidated Fuel Co., Sarah Mine. Dalna	Amburgy	1-B	450
381. Consolidated Fuel Co., Elsie Mine. Dalna	No. 4	1-B	300
382. Caudill Branch Coal Co. David	No. 4	1-B	600

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Seams Operated	Mine Capacity in Tons
383. Marian Coal Co. Blackey	No. 4	1-B	400
384. Rockhouse Coal Co. Blackey	No. 4	1-B	200
385. Consolidated Fuel Co. Blackey	No. 4	1-B	500
386. Blackey Coal Corp. Blackey	No. 4	1-B	200
387. Ulvah Coal Co. Bluefield	No. 4	1-B	200
388. Blackwood Coal & Coke Co., Blackwood, Va.	High Splint	1-B	200

MC CREARY COUNTY

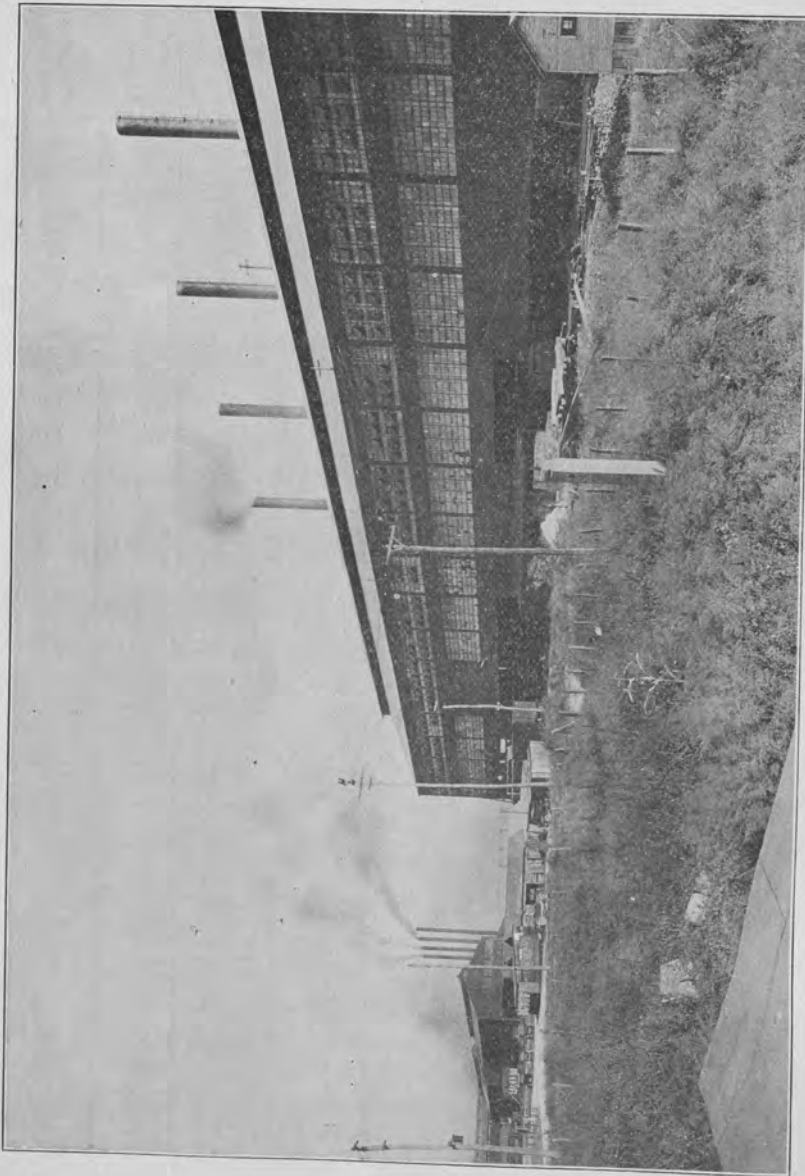
389. Stearns Coal & Lumber Co., No. 1. Barthel	No. 2	1-B	700
390. Stearns Coal & Lumber Co., No. 4. Worley	No. 1½	1-B	1,000
391. Stearns Coal & Lumber Co., No. 11	Yamacraw	1-B	800
292. Stearns Coal & Lumber Co., No. 10	Yamacraw	No. 1½	400
393. Stearns Coal & Lumber Co., No. A	Shoupman	No. 1	800
394. Com Argo Coal Co. Lacleman	No. 2		
	No. 1½	2-B	400
395. Premier Coal Co. Yamacraw	No. 1		
	(Under construction)	No. 1½	2,000
396. Paint Cliffs Mines Co. Paint Cliffs	No. 2	1-B	150
397. St. Mehiel Coal Co. Paint Cliffs	No. 2	1-B	100
	(Under construction)		
398. Bry-Mac Coal Co. Silerville	No. 4	1-B	300
399. Eagle Coal Co. Barren Fork	No. 3	1-B	300
400. United States Coal Mining Co. Wyborg	No. 3 (?)	1-B	150
401. Tate, Souley, Eret Coal Co., Indian Head	No. 3 (?)	1-B	100
402. J. D. Erskin Coal Co. Parkers Lake	No. 3 (?)	1-B	100

MORGAN COUNTY

403. Ky. Block Cannel Coal Co., No. 20	Cannel City	Cannel Coal No. 2	1-C	150
404. Ky. Block Cannel Coal Co., East Prossia	Cannel City	Cannel Coal No. 2	1-C	150

PERRY COUNTY

405. Hembro Coal Co. Hembro	No. 8, No. 7			
	No. 4	3-B	150	
406. Baker Coal Co. Hazard	No. 4	1-B	200	
407. Masons Creek Coal Co. Viper	No. 4	1-B	50	
408. Clinton Coal Co. Jeff	No. 4	1-B	350	
	(Under construction)			
409. Hazard Block Coal Co. Happy	No. 4	1-B	250	
	(Under construction)			
410. Happy Coal Co. Jeff	No. 4	1-B	600	
	(Under construction)			
411. Defiance Coal Co. Happy	No. 7	1-B	400	
	(Under construction)			
412. Carr Fork Coal Co. Sassafras	No. 9, No. 7			
	No. 4	3-B	750	
413. Montgomery Creek Coal Co. Sassafras	No. 4	1-B	400	
414. Kenmont Coal Co. Jeff	No. 9, No. 7	2-B	1,050	
	(Under construction)			
415. Storm King Coal Mining Co. Jeff	No. 4	1-B	400	
416. Reliance Coal & Coke Glemawr	No. 7	1-B	600	
417. Diamond Block Coal Co. Diablock	No. 4	1-B	500	



AMERICAN ROLLING MILL CO.
This view shows the old plant of the American Rolling Mill Co., at Ashland, Ky. It was formerly owned and operated by the Ashland Iron and Mining Co., and is a large consumer of Kentucky and West Virginia coal.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
418. Four Sema Block Collieries Co.	Diablock	No. 4	1-B 500
419. Columbus Mining Co.	Christopher	No. 4	1-B 600
420. Ashless Coal Corp., No. 2	Lothair	No. 4	1-B 150
421. Ashless Coal Corp., No. 1	Lothair	No. 4	1-B 600
422. Algomar Block Coal Co.	Lothair	No. 7	1-B 500
423. Hazard Blue Grass Coal Co., No. 1	Hazard	No. 7, No. 4	2-B 730
424. Hazard Blue Grass Coal Co., No. 2	Hazard	No. 7, No. 4	2-B 1,250
425. McIntosh Coal Co.	Hazard	No. 4	1-B 100
426. Walker Branch Mining Co.	Hazard	No. 4	1-B 150
427. Columbus Mining Co., No. 4	Hazard	No. 4	1-B 1,000
428. Columbus Mining Co., No. 5	Hazard	No. 7, No. 5	2-B 1,500
429. Columbus Mining Co., No. 6	Hazard	No. 4	1-B 500
(Under construction)			
430. Darb Fork Coal Co.	Hazard	No. 4	1-B 500
431. Indian Head Coal Co.	Hazard	No. 4	1-B 300
432. Trace Fork Coal Co.	Bulan	No. 4	1-B 300
433. Ajax Coal Co.	Bulan	No. 4	1-B 500
434. Lots Creek Coal Co.	Bulan	No. 7	1-B 350
435. Maynard Coal Co.	Heiner	No. 7	1-B 750
436. Ky. River Coal Co.	Whitsett	No. 7	1-B 725
437. Midland Mining Co.	Tribboy	No. 7	1-B 800
438. Hardy Burlingham Mining Co.	Hardburly	No. 8, No. 7	2-B 6,000
439. Maynard Coal Co., No. 6	Lennut	No. 7, No. 4	2-B 800
440. Maynard Coal Co., No. 7	Lennut	No. 7	1-B 310
441. Superior Coal Co., No. 4	Lennut	No. 4	1-B 350
442. Himyar Coal Co.	Domino	No. 6, No. 4	2-B 1,250
443. Hazard Jellico Coal Co.	Staub	No. 6	1-B 1,100
444. First Creek Coal Co.	Blue Diamond	No. 6	1-B 1,575
445. Blue Diamond Coal Co.	Blue Diamond	No. 6	2,500
446. Ky. Block Coal Mining Co.	Typo	No. 6	1-B 600
447. Crawford Coal Corp.	Bonnyman	No. 6	1-B 1,150
448. Liberty Coal Co.	Bonnyman	No. 6	1-B 600
449. Mitchell-Willis Coal Co.	Typo	No. 6	1-B 300
450. Black Joe Coal Co.	Butterfly	No. 6	1-B 250
451. Buckhorn Coal & Lumber Co.	Yerkes	No. 6	1-B 100
452. Solar Coal Co.	Yerkes	No. 6	1-B 300
453. Yerkes Coal Co.	Yerkes	No. 6	1-B 50
454. Blue Jay Coal Co.	Hazard	No. 4	1-B 300
455. Lincoln Coal Co.	Krypton	No. 7, No. 6, No. 5, No. 4	4-B 500
456. Ledford Coal Co.	Krypton	No. 4	1-B 100
457. York Coal Co.	Krypton	No. 4	1-B 250
458. Muncie Mining Co.	Krypton	No. 5 (?)	1-B 600
459. Southeast Coal Co.	Krypton	No. 4	1-E 100
460. Colvan Mining Co.	Chavies	No. 4	1-B 50
461. Coneva Coal Corp.	Chavies	No. 4 Rider	1-B 600
462. Verdun Coal Co.	Chavies	No. 5	1-B 50
463. Klencole Mining Co.	Ulvah	No. 4	1-B 100
464. East Kentucky Coal Co.	Fusonia	No. 4	1-B 75
465. Fort Branch Coal Co.	Fusonia	No. 4	1-B 250

PIKE COUNTY

466. Furnace Coal Mining Co.	Boldman	No. 2, No. 1	2-B 150
467. Christian & Darby Mining Co., Mossy Bottom	Low. Elkhorn		1-B 40
468. Mossy Bottom Coal Co.	Mossy Bottom	Upper Elkhorn	2-B 75
469. Steel Coal Co.	Mossy Bottom	Big Elkhorn	1-B 300
470. Keyser Coal Co.	Keyser	Keyser	1-B 350
471. James Hatcher Coal Co.	Big Shoal	Low. Elkhorn	2-P 200
472. Coal Run Mining Co.	Coal Run	Upper Elkhorn	2-B 125
		Top, Bottom	

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
473. Deel Coal Co. Pikeville	Top, Bottom	2-B	100
474. Elkhorn Kanawha Coal Co. Praise	Elkhorn	1-B	150
475. Elkhorn Kanawha Coal Co. Praise	Elkhorn	1-B	200
476. Elkhorn Gas Coal Co. Praise	Elkhorn No. 1	1-B	200
477. Peerless Elkhorn Coal Co. Praise	Auxler	1-B	100
478. Lower Elkhorn Coal Co. Praise	No. 2, No. 1	2-B	60
479. Ky. Elkhorn Coal Corp. Praise	Elswick	1-B	200
480. Paragon Elkhorn Collieries. Dunleary	Low. Elkhorn.	1-B	400
481. Praise Elkhorn Coal Co. Dunleary	Lower Marrow Bone	2-B	250
482. McKinney Steel Co., Inc. Wolf Pit	Low. Elkhorn.	2-B	250
483. Marrow Bone Mining Co. Lookout	Upper Elkhorn	2-B	1,000
484. Solvay Coal & Coke Co. Lookout	Low. Elkhorn.	2-B	500
485. Solvay Coal & Coke Co. Lookout	Elkhorn No. 2	2-B	450
486. Solvay Coal & Coke Co. Lookout	Elkhorn No. 2	2-B	450
487. Solvay Coal & Coke Co. Hellier	Elkhorn No. 1	2-B	350
488. Greenough Coal Co. Hellier	Upper Elkhorn	2-B	900
489. Manufactures Coal & Coke Co. Hellier	Low. Elkhorn.	2-B	750
490. Winston Elkhorn Coal Co. Kewanee	Upper Elkhorn	2-B	700
491. McKinney Steel Co. Alka	Low. Elkhorn.	1-B	100
492. Shelby Coal Co. Shelbyana	Upper Elkhorn	2-B	800
493. Winston Elkhorn Coal Co. Kewanee	Upper Elkhorn	1-B	50
494. Big Hollow Coal Co. Pikeville	Low. Elkhorn.	2-B	250
495. Pond Creek Coal Co., No. 7. McVeigh	Upper Elkhorn	2-B	150
496. Pond Creek Coal Co., No. 6. McVeigh	Low. Elkhorn.	1-B	900
497. Pond Creek Coal Co., No. 5. Pinson Fork	Pond Creek	1-B	600
498. Marietta Coal Co. Pinson Fork	Pond Creek	1-B	800
499. Pond Creek Coal Co., No. 8. Pinson Fork	Pond Creek	1-B	125
500. Victor Coal Co. Stone	Alma	1-B	600
501. Pond Creek Coal Co., No. 4. Stone	Pond Creek	2-B	300
502. Blake Coal Mining Co. Stone	Pond Creek	1-B	600
503. Sullivan Pond Creek Coal Co. Shock	Pond Creek	1-B	200
504. Triangle Coal Co. Stone	Pond Creek	1-B	250
505. Pond Creek Coal Co., No. 3. Stone	Pd. Ck. Rider	2-B	100
506. Tierney Mining Co. Stone	Pond Creek	1-B	800
507. Sudduth Fuel Co. Stone	Pond Creek	1-B	1,000
508. Mud Lick Coal Co. Sharondale	Pond Creek	1-B	800
509. Sharon Coal & Coke Co. Sharondale	Alma	2-B	150
510. Orinoco Mining Co. Orinoco	Pond Creek	1-B	450
511. Solvay Coal & Coke Co. Orinoco	Pond Creek	1-B	400
512. Banner Pond Creek Coal Co. Orinoco	Pond Creek	1-B	800
513. Carry-On Coal Co. Toler	Thacker	1-B	150
514. Pond Creek Coal Co., No. 1. Hardy	Pond Creek	2-B	250
515. Pond Creek Coal Co., No. 2. Hardy	Pond Creek	1-B	500
516. Bailey Fuel Co. Toler	Pond Creek	1-B	500
517. Black Gem Coal Co. Toler	Pond Creek	1-B	450
			300

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
518. Leckie Collieries Co. Alka	Thacker		
	Pond Creek	2-B	1,000
519. All Bon Coal Corp. McCarr	Top Seam	1-B	550
520. Alma Thacker Fuel Co. McCarr	Thacker,		
	Alma		
	Freeburn	3-B	1,000
521. Majestic Collieries Majestic	Glen Allum		
	Warfield	2-B	500
522. R. H. Elkhorn Coal Corp. Selbiana	Elkhorn No. 3		
(Under construction)	Elkhorn No. 2		
	Elkhorn No. 1	3-B	600
	Penny	1-B	175
523. Buckfield Coal Co. Yeager	Low. Elkhorn.	1-B	330
524. Elkhorn Seam Collieries Co. Yeager	No. 2, No. 1	2-B	400
525. Ford Elkhorn Mining Co. Robinson Creek	Upper Elkhorn		
526. J. B. Elkhorn Coal Co. Hildason	Low. Elkhorn.	2-B	550
	Upper Elkhorn	1-B	650
527. Elkhorn & Shelby Creek Coal Co. Esco	Upper Elkhorn	1-B	500
528. Rogers Bros. Coal Co. Virgie	Upper Elkhorn	1-B	500
529. Ky. Block Fuel Co. Jonancy	Upper Elkhorn	2-B	400
	Low. Elkhorn.	2-B	400
530. Ky. Elkhorn By-Product Coal Co. Dorton	Upper Elkhorn	1-B	400
531. Funk Coal Co. Sutton	Upper Elkhorn	1-B	90
532. Black Diamond By-Product Coal Co. Williamson, W. Va.	Pond Creek	1-B	150
	Thacker	1-B	225
533. Pond Creek By-Product Co. Williamson, W. Va.	Pond Creek	1-B	150
534. West Virginia By-Product Co. Williamson, W. Va.	Alma		
535. Burnwell Coal & Coke Co. Sprigg, W. Va.	Burnwell	2-B	500
	Thacker		
536. Thacker Coal Mining Co. Rose Siding, W. Va.	Alma	2-B	400
	Thacker		
537. Portsmouth Solvay Coke Co., Freeburn Plant No. 1. Edgerton, W. Va.	Freeburn	2-B	100
538. Portsmouth Solvay Coke Co., Freeburn Plant Nos. 2 & 3. Edgerton, W. Va.	Thacker		
	Freeburn	2-B	1,100
539. Vulcan Collieries Vulcan, W. Va.	Thacker		
	Alma		
	Pond Creek	3-B	700
540. Fall Branch Coal Co. Chatteroy, W. Va.	Thacker	1-B	1,500
541. Borderland Coal Corporation, No. 1. Borderland, W. Va.	Winefred		
	Taylor	2-B	700
542. Borderland Coal Corporation, No. 2. Borderland, W. Va.	Winefred		
	Taylor		
	Thacker	3-B	700
543. Cub Mountain Coal & Coke Co. Nolan, W. Va.	Winefred		
(Under construction)	Taylor		
	Thacker	3-B	250
PULASKI COUNTY			
544. Alpine Collieries Co. Alpine	No. 1 (?)	1-B	50
WHITLEY COUNTY			
545. Proctor Coal Co. Red Ash	Jellico	1-B	50
546. Proctor Coal Co. Red Ash	Jellico	1-B	50
547. Stein Coal Co. Red Ash	Blue Gem	1-B	25
548. Proctor Coal Co. Red Ash	Blue Gem	1-B	15
549. Main Jellico Mountain Coal Co. Kensee	Jellico	1-B	250
550. Jellico Coal Mining Co. Mountain Ash	Jellico	1-B	400
551. Estes Jellico Coal Co. Pleasant View	Jellico	1-B	100

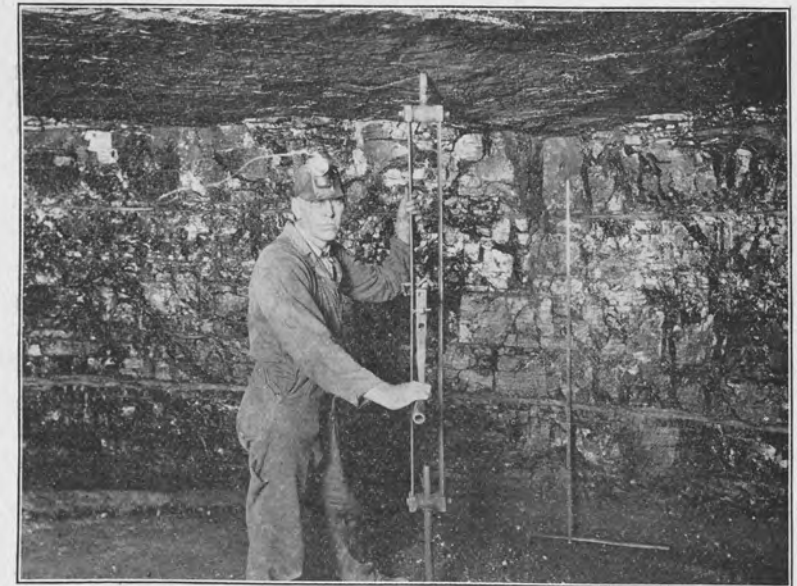
Name of Mining Corporation and Post Office	Name of Coal	No. and Kind Coal Seams Operated	Mine Capacity in Tons
552. Bon Jellico Coal Co.....Bon Jellico	Jellico	1-B	400
553. Dal Blue Gem Coal Co.....Dal	Blue Gem	1-B	25
554. High Up Coal Co.....Dal	Blue Gem	1-B	40
555. Dessie Ellen Coal Co.....Dal	Blue Gem	1-B	50
556. Patterson Creek Coal Co.....Nevisdale	Blue Gem	1-B	50
557. Folly Coal Co.....Packard	Blue Gem	1-E	100
558. Mahan Jellico Coal Co.....Packard	Jellico	1-B	500
559. Gatliff Coal Co., No. 1, No. 2.....Gatliff	Jellico	1-B	700
560. Gatliff Coal Co., No. 3.....Gatliff	Jellico	1-B	500
561. Gatliff Coal Co., No. 4.....Gatliff	Blue Gem	1-B	100
562. Gatliff Coal Co., No. 5.....Gatliff	Blue Gem	1-B	50
563. Mammoth Blue Gem Coal Co., No. 1.....Gatliff	Blue Gem	1-B	20
564. Mammoth Blue Gem Coal Co., No. 2.....Gatliff	Blue Gem	1-B	100
565. Drake Blue Gem Coal Co., No. 1.....Nevisdale	Blue Gem	1-B	50
566. Drake Blue Gem Coal Co., No. 2.....Nevisdale	Blue Gem	1-B	75
567. Cumberland Oil & Coke Co.....Nevisdale	Blue Gem	1-B	20
568. Old Mount Morgan Coal Co.....Williamsburg	Jellico	1-B	100
569. Moss Jellico Coal Co.....Warford	Jellico	1-B	75
570. New Watts Creek Coal Co.....Warford	Jellico	1-B	25
571. East Tenn. Coal Co.....Jellico, Tenn.	Blue Gem	1-B	50
572. S. Daugherty Coal Co.....Jellico, Tenn.	Blue Gem	1-B	25
(R. R. No. 3)			
573. Evans Jellico Coal Co.....Jellico, Tenn.	Jellico	1-B	125
(R. R. No. 1)			
574. Buck Hollow Coal Co.....Jellico, Tenn.	Blue Gem	1-B	175
(R. R. No. 1)			

CHAPTER IX.

THE WESTERN COAL FIELD

Although the first to gain prominence as a large regional coal producer because of its geographic position and low topographic figure, the western coal of Kentucky was destined from the beginning to be eventually superseded by the newer and larger eastern field. The two fundamental causes of this relegation to second place are chiefly geological, (1) restricted area due to erosion, and (2) lower grade coals due probably to a semi-isolation during Coal Measure times which was induced by that great geologic barrier, the Cincinnati arch.

Despite these facts, however, the western coal field is a very remarkable and valuable one. Its thick and easily operated No. 9 and No. 11 coals, which are of Allegheny age, are without doubt the equal within their class of any bituminous coals in the east-



THE PRIDE OF WESTERN KENTUCKY

Face of No. 11 coal, Nisbett Mine, one mile from Earlinton. This mine is owned by the St. Bernard Coal Co. This view shows 80 inches of coal and 2 inches of parting. The roof is shale and the bottom fire clay. The room is 40 E. Sixth entry, 250 feet from the entrance.

ern United States. They form the backbone of the great mining industry of western Kentucky though a number of coals of lesser general significance both higher and lower in the series are operated very successfully. The Louisville and Nashville railroad, the Louisville, Henderson and St. Louis railroad, and the Illinois Central railroad serve this field.

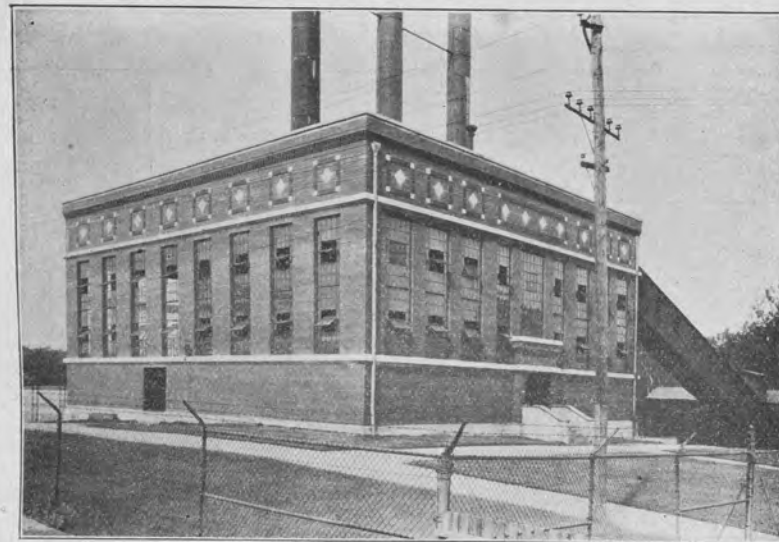
There were all told 149 coal operations in the ten counties comprising the western coal field in 1921. The number of operations in this field is now undoubtedly somewhat larger. As has already been indicated, the most of the coal is mined by shafting methods, though all methods are used at one point or another. Hopkins county heads the list with 36 operations and Daviess and Hancock are at the bottom with one each.

WESTERN COUNTIES AND OPERATIONS

County	Number of Operations	Field Rank	County	Number of Operations	Field Rank
Christian	8	8	Muhlenberg	32	2
Daviess	1	9	Ohio	16	4
Hancock	1	10	Union	14	5
Henderson	11	6	Webster	31	3
Hopkins	36	1			
MeeLan	5	7	Total 149.		

The western coal field is unique in that it has the largest and the most completely equipped wagon mine in the state. This is the Nicholson Coal Co., operating at Henderson, near the fair grounds. It operates No. 9 coal at a depth of about 180 feet and produces a very large part of the coal used in Henderson and the adjoining countryside. Shaft depths in western Kentucky vary greatly even within short distances. An example of this may be seen at Madisonville where No. 11 coal is mined at a depth of 40 or 50 feet just east of the town. A few miles northeast of this city, due to the rapid dip of the measures, the No. 11 coal is mined by shaft at a depth of about 300 feet.

Although there are nearly three times as many operations in eastern Kentucky as in western Kentucky, the average mine in the western part of the state has a very much larger daily



ST. BERNARD POWER PLANT

This complete power unit is located near Earlington in the Western coal field. It is now furnishing power for seven mines and its capacity can be doubled. It is reported to have cost upwards of a million dollars.

capacity. In the following list the 149 mines have a total daily capacity of 89,190 tons or an average of 606 tons per day. The 574 mines of eastern Kentucky at the same time had a total capacity of 247,265 tons, an average of only 431 tons per mine per day, or a little more than two-thirds of the average capacity of the western Kentucky coal mines. The determination of the name of the coal operated, hereinunder given, is that of the operator, insufficient time and funds being available to obtain this information in any other way. Information here presented is the result of new and original investigations made by the Kentucky Geological Survey in the field during the year 1921.

WESTERN KENTUCKY COALFIELD.

CHRISTIAN COUNTY.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Seams Operated	Mine Capacity in Tons
1. Memphis Coal Mining Co.....Mannington	Mannington	1-B	250
2. Empire Coal Co.....Empire	Empire	1-B	300

DAVISS COUNTY.

3. Universal Coal Co.....Owensboro	Stray	1-B	75
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HANCOCK COUNTY.

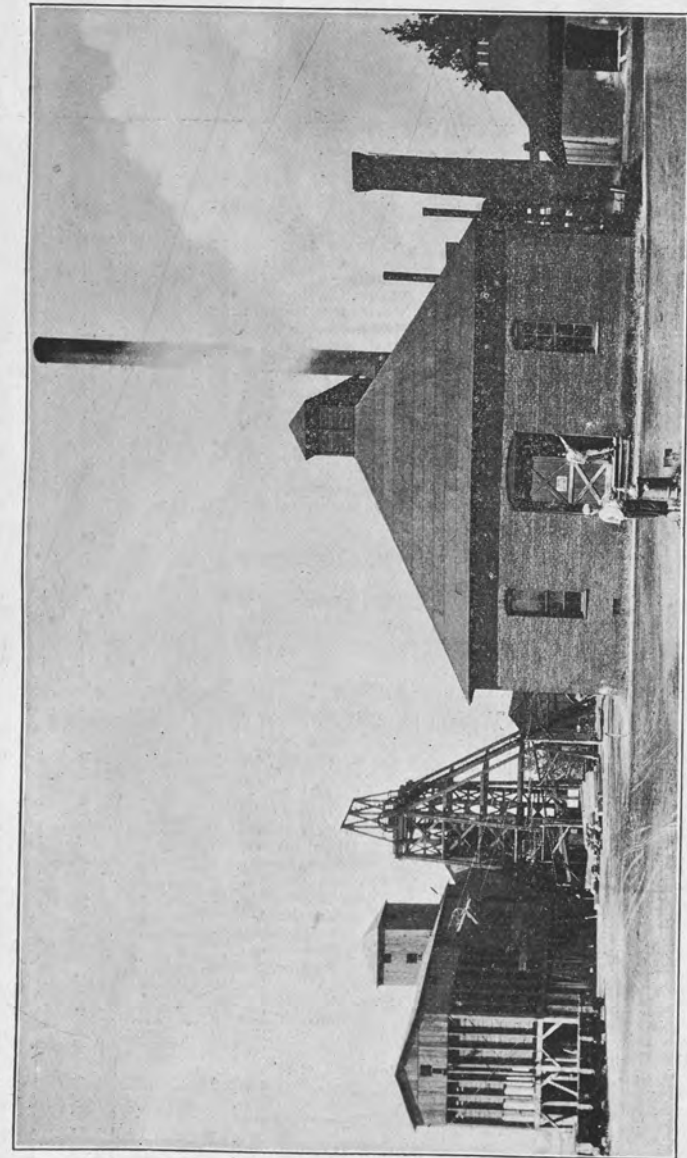
4. Powers Coal Co., Mine No. 2...Hawesville	No Name	1-B	Not Oper.
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HENDERSON COUNTY.

5. Cahaba Coal Co.....Corydon	Stray	1-B	250
6. Clyden Coal Co.....Henderson		Not Oper.	
7. Southland Coal Co., No. 1.....Henderson	No. 9	1-B	700
8. Southland Coal Co., No. 3.....Henderson	No. 9	1-B	600
9. Canoe Coal Co.....Henderson	No. 9	1-B	200
10. Dixie Coal Co.....Spottsville	No. 7	1-B	100
11. Archibald Coal Co.....Bluff City	No. 7	1-B	150
12. Riverside Coal Co.....Utopia	No. 7	1-B	100
13. Pittsburg Coal Co.....Easkett	No. 9	1-B	700
14. Vennings Coal Co.....Spottsville	No. 9	1-B	200
15. Panama Coal Co.....Robard	No. 9	1-B	600

HOPKINS COUNTY.

16. Norton Coal Mining Co., No. 1...Nortonville	No. 9, No. 11	2-B	1,500
17. Norton Coal Mining Co., No. 2...Nortonville	No. 11, No. 12	2-B	300
18. West Jellico Coal Co., No. 3...Nortonville	No. 14	1-B	400
19. West Jellico Coal Co., Nos. 1, 2.....Nortonville	No. 14	1-B	400
20. Stipling Coal Co., Seminole...Daniel Boone	No. 14	1-B	300
21. Stipling Coal Co., Daniel Boone.....Daniel Boone	No. 14	1-B	600
22. Caney Creek Coal Co.....Daniel Boone	No. 9	1-B	150
23. Dunning & Gordon Coal Co.....St. Charles	No. 9	1-B	300
24. St. Bernard Coal Co., Fox Run Mine.....St. Charles	No. 9	1-B	1,500
25. Buckrun Coal Co.....St. Charles	No. 9	1-B	250
26. Carbondale Coal Co.....Carbondale	No. 9	1-B	700
27. Crabtree Coal Co.....Ilsley	No. 9	1-B	1,000
28. St. Bernard Coal Co., South Diamond Mine.....Earlington	No. 9	1-B	900
29. St. Bernard Coal Co., Arnold Mine.....Earlington	No. 9	1-B	1,000
30. St. Bernard Coal Co., Mine No. 11.....Earlington	No. 9	1-B	1,300
31. St. Bernard Coal Co., Mine No. 9.....Earlington	No. 9	1-B	900
32. St. Bernard Coal Co., Hecla Mine.....Earlington	No. 9	1-B	800



A HOPKINS COUNTY MINE
In the left background is the tippie of the Reneky Coal Mine, Madisonville, Ky. The brick building in the foreground is the power plant.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
33. St. Bernard Coal Co., North Diamond Mine	Earlington	No. 9 1-B	2,500
34. Hart Coal Corp., Victoria Mine No. 11	Morton	No. 11 1-B	1,000
35. Hart Coal Corp., Victoria Mine No. 9	Morton	No. 9 1-B	850
36. Coil Coal Co.	Madisonville	No. 11 1-B	1,000
37. Sunset Coal Co.	Madisonville	No. 11 1-B	1,000
38. Grape Vine Coal Co., No. 1	Madisonville	No. 11 1-B	900
39. Grape Vine Coal Co., No. 2	Madisonville	No. 9 1-B	
40. Sunlight Mining Co.	Madisonville	No. 11 1-B	1,500
41. Pontiac Coal Co.	Madisonville	No. 11 1-B	500
42. Hamlet Mining Co.	Madisonville	No. 9 1-B	500
43. Hart Coal Corp., Kingston Mine	Morton	No. 9 1-B	1,500
44. Reincke Coal Mining Co.	Madisonville	No. 11 1-B	1,000
45. Chickasaw Coal Co.	Madisonville	No. 11 1-B	200
46. Jones Brothers Coal Co.	Madisonville	No. 11 1-B	150
47. Boyce Coal Co.	Madisonville	No. 11 1-B	500
48. Coiltown Mining Co.	Providence	No. 14, No. 9 2-B	500
49. Circle City Coal Co.	Providence	No. 14 1-B	500
50. St. Bernard Mining Co., Luten Mine	Providence	No. 9 1-B	1,000
51. B. D. Williams Coal Co.	Mannington	Mannington 1-B	300

McLEAN COUNTY.

52. Memphis Coal Co.	Island	No. 9 1-B	650
53. White Coal Co.	Island	No. 9 1-B	350
54. Turner Coal Co.	Island	No. 9 1-B	100
55. Reynolds Coal Co.	Island	No. 9 1-B	100
56. Island Block Coal Co.	Island	No. 9 1-B	300

MUHLENBERG COUNTY.

57. Kirk Coal Co.	Beech Creek	No. 9 1-B	900
58. Beech Creek Coal Co., Monray Mine	Beech Creek	No. 9 1-B	700
59. Beech Creek Coal Co., No. 1	Beech Creek	No. 9 1-B	1,200
60. Beech Creek Coal Co., No. 2	Beech Creek	No. 9 1-B	300
61. W. A. Wickliff Coal Co.	Browder	No. 9 1-B	2,000
62. Black Diamond Coal Co., No. 2	Drakesboro	No. 9 1-B	800
63. Thompson Coal Co.	Drakesboro	No. 9 1-B	350
64. Black Diamond Coal Co., No. 1	Drakesboro	No. 9 1-B	700
65. Phoenix Coal Co., Peanut Mine	Trama	No. 9 1-B	150
66. Phoenix Coal Co., Sunrise Mine	Trama	No. 9 1-B	800
67. Rogers Bros. Coal Co.	Bevier	No. 9 1-B	1,200
68. Crescent Coal Co.	Bevier	No. 9 1-B	1,200
69. Gibraltar Coal Mining Co., Holt Mine	Central City	No. 9 1-B	1,000
70. Bevier Coal Co.	Cleaton	No. 9 1-B	1,000
71. Madison Coal Corp.	Central City	No. 9 1-B	1,500
72. Gibraltar Coal Mining Co., Brownie Mine	Central City	No. 9 1-B	700
73. Nelson Creek Coal Co.	Central City	No. 9 1-B	500
74. Greenville Coal Co., Martwich Mine	Martwich	No. 9 1-B	1,100
75. Haydon Coal Co.	Mercer	No. 11 1-B	200
76. Pacific Coal Co.	Mercer	No. 9 1-B	500
77. Mercer Coal Co.	Mercer	No. 9 1-B	1,000
78. Gibraltar Coal Mining Co., Gibraltar Mine	Mercer	No. 9 1-B	1,400

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Coal Seams Operated	Mine Capacity in Tons
73. Midland Coal Co.	Midland	No. 9 1-B	1,000
80. Hillside Coal Co.	Hillside	No. 9 1-B	150
81. Wickliff Conners Coal Co.	Hillside	No. 11 1-B	150
82. Liberty Coal Mining Co.	Hillside	No. 9 1-B	600
83. Oakland Coal Co.	Greenville	No. 9 1-B	450
84. Greenville Coal Co., Powderly Mine	Powderly	No. 9 1-B	1,500
85. W. G. Duncan Coal Co., Luzerne Mine	Luzerne	No. 9 1-B	1,500
86. Midwest Coal Co.	De Poy	No. 9 1-B	250
87. W. G. Duncan Coal Co., Graham Mine	Graham	No. 9 1-B	3,000
88. Green River Collieries Co.	Moorman	No. 9 1-B	1,500

OHIO COUNTY.

89. Kimbley Coal Co.	Equality	No. 11 1-B	500
90. Rockport Coal Co., No. 2	Centertown	No. 9 1-B	500
91. Bishop Coal Co.	Centertown	Stray 1-B	250
92. Tichenor Coal Co.	Centertown	Stray 1-B	250
93. West Hartford Coal Co.	Hartford	Stray 1-B	300
94. Rockport Coal Co., No. 1	Rockport	No. 9 1-B	700
95. Ky. Coke Co., Echols Mine	Echols	No. 9 1-B	880
96. Broadway Coal Co.	Simmons	No. 9 1-B	500
97. Holt Bros. Coal Co.	McHenry	No. 9 1-B	500
98. Beaver Dam Coal Co., Taylor Mine	Beaver Dam	No. 9 1-B	600
99. Beaver Dam Coal Co., Williams Mine	Beaver Dam	No. 9 1-B	800
100. Huff Mines	McHenry	No. 9 1-B	150
101. Central Coal & Iron Co. (Old Rander ? Mine)	McHenry	No. 9 1-B	400
102. C. W. Wells Coal Co.	Deanfield	Stray (?) No. 4 1-B *	175
103. Jellico Coal Co.	Horton	No. 9 1-B	100
104. Livermore Coal Co.	Livermore	No. 7 1-B	60

UNION COUNTY.

105. West Ky. Coal Co., No. 9	Sturgis	No. 9 1-B	800
106. West Ky. Coal Co., No. 2	Sturgis	No. 9 1-B	600
107. West Ky. Coal Co., No. 1	Sturgis	No. 9 1-B	500
108. West Ky. Coal Co., No. 10	Sturgis	No. 9 1-B	300
109. Bell Union Coal Co., Davis Mine	DeKoven	No. 9 1-B	950
110. Town Coal Co.	DeKoven	No. 9 1-B	300
111. Bell Union Coal Co.	Curlew	No. 9 1-B	600
112. West Ky. Coal Co., No. 8	Sturgis	No. 9 1-B	800
113. Herculese Coal Co.	Morganfield	No. 11 1-B	200
114. Morganfield Coal Mining Co.	Morganfield	No. 11 1-B	200
115. Baxter Coal Co.	Uniontown	No. 11 1-B	300
116. Southland Coal Co., No. 2	Uniontown	No. 11 1-B	300
117. Union Co. Coal & Mining Co.	Uniontown	No. 11 1-B	300
118. Producers Coal Co.	Waverly	No. 11 1-B	600

WEBSTER COUNTY.

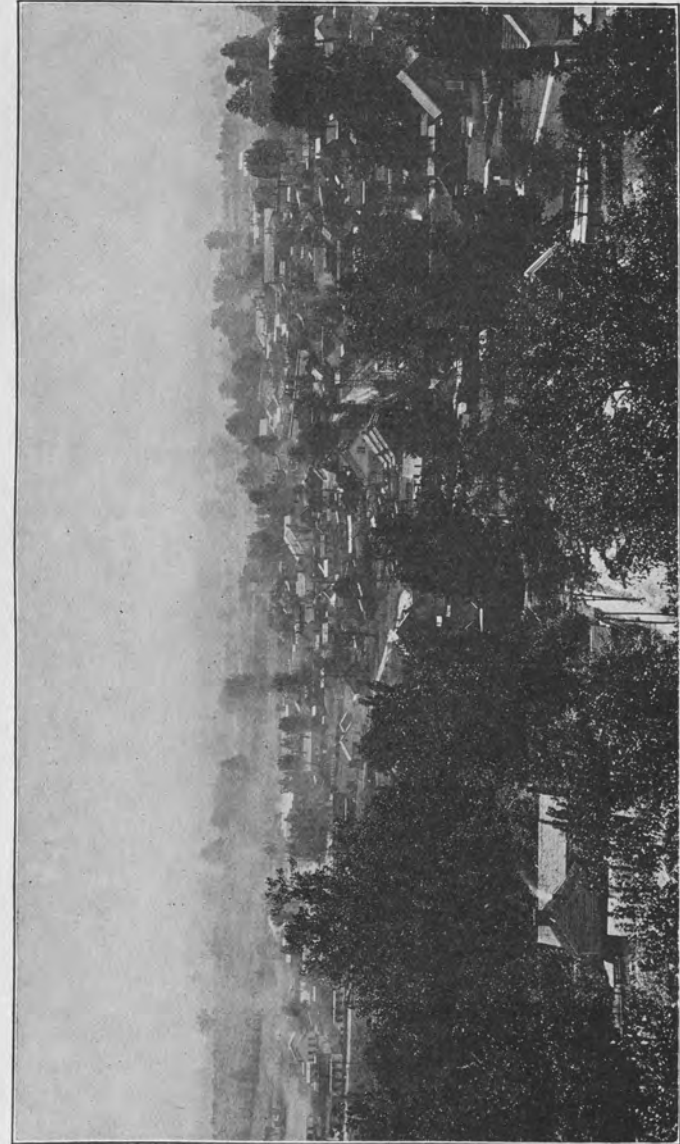
119. Sebree Coal Co. (Under construction)	Sebree	No. 9 1-B	
123. St. Bernard Mining Co., Shamrock	Providence	No. 11 1-B	2,500
121. Wynn Coal Co.	Providence	No. 11 1-B	100

*Thin Cannel Parting.

Name of Mining Corporation and Post Office	Name of Coal	No. and Kind of Seams Operated	Mine Capacity in Tons
122. Victor Coal Co., Providence	No. 11	1-B	200
123. Economy Coal Co., Providence	No. 11	1-B	350
124. Duvin Coal Co., Providence	No. 9	1-B	1,200
125. Hall-Force Coal Co., Providence	No. 9	1-B	300
126. Dever Coal Co., Providence	No. 9	1-B	250
127. Providence Coal Mining Co., No. 2, Providence	No. 9	1-B	500
128. Pleasant Valley Coal Co., Providence	No. 9	1-B	250
129. Cox & Baker Coal Co., Providence	No. 9	1-B	100
130. Leeper Coal Co., Providence	No. 9	1-B	300
131. Young & Morgan Coal Co., Providence	No. 9	1-B	250
132. Ruckman Coal Co., Providence	No. 9	1-B	500
133. Hunter Coal Co., Providence	No. 11	1-B	300
134. R. & A. Coal Co., Providence	No. 11	1-B	150
135. Highland Mining Co., Providence	No. 11	1-B	500
136. Providence Coal Mining Co., No. 3, Providence	No. 9	1-B	700
137. Diamond Coal Co., No. 1, Providence	No. 9	1-B	500
138. Diamond Coal Co., No. 2, Providence	No. 9	1-B	300
139. Diamond Coal Co., No. 3, Providence	No. 9	1-B	300
140. Luton Coal Mining Co., Providence	No. 9	1-B	150
141. Old Hickory Coal Co., Providence	No. 9	1-B	150
142. Clifty Consolidated Coal Co., No. 1, Clay	No. 9	1-B	700
143. Clifty Consolidated Coal Co., No. 2, Clay	No. 11	1-B	50
144. Oyama Coal Co., Providence	No. 9	1-B	100
145. West Ky. Coal Co., No. 7, Clay	No. 9	1-B	2,000
146. West Ky. Coal Co., No. 5, Clay	No. 11	J-B	500
147. West Ky. Coal Co., No. 3, Wheatcroft	No. 11	1-B	600
148. West Ky. Coal Co., No. 4, Wheatcroft	No. 11	1-B	600
149. West Ky. Coal Co., No. 6, Wheatcroft	No. 9	1-B	350

OPERATING COAL MINES

Eastern Kentucky Coalfield	574
Western Kentucky Coalfield	149
Total operating coal mines in 1921	723



PROVIDENCE, KENTUCKY
 This is one of the important coal mining towns of the Western coal field. It is located in southern Webster County, close to the Hopkins County line. During recent years this town and the coal industry of the region adjoining has had a phenomenal growth. The view is to the southeast.

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APPENDIX A.

The coal fields of Kentucky are almost entirely mapped by standard U. S. Geological Survey topographic sheets to the scale of 1:62,500 and 1:125,000. This mapping has been executed to a very large extent in co-operation with the Kentucky Geological Survey. The eastern part of Hancock, northeastern Ohio, northwestern Grayson, central eastern Hart, western McCreary, northern Morgan, western Elliott and Carter, eastern Harlan, southeastern Pulaski, and northern Greenup still remain to be completed. This work is now in progress. Any of the following quadrangles, all of which show portions of the coal fields of this state, may be secured for ten cents apiece to cover cost and postage, from the Director of the Kentucky Geological Survey at Frankfort.

1. EASTERN KENTUCKY. Cornettsville, Beattyville, London, Estillville, Harold, Hindman, Prestonsburg, Paintsville, Inez, Regina, Mattewan, Williamson, Cumberland Gap, Nolansburg, Salyersville, Troublesome, Harlan, Pikeville, Buckhorn, Williamsburg, Manchester, Kenova, Pound and Whitesburg.

2. WESTERN KENTUCKY. Drakesboro, Brownsville, Cub Run, Horse Branch, Dawson Springs, Nortonville, Madisonville, Earlington, Leitchfield, Morganfield, Mammoth Cave, Shawneetown, Providence, Uniontown, Cave-in-Rock, Henderson, Sebree, Owensboro, Newburg, Calhoun, Whitesville, Tell City, Hartford and Central City.

APPENDIX B.
KENTUCKY COAL OPERATORS' ASSOCIATIONS

MR. J. E. JOHNSON, Secretary,
Hazard Coal Operators' Association,
Lexington, Kentucky.

MR. ED CLAYTON, Secretary,
Harlan Coal Operators' Association,
Harlan, Kentucky.

MR. R. E. HOWE, Secretary,
South Appalachian Coal Operators' Association,
Holston National Bank Building,
Knoxville, Tennessee.

MR. J. C. REED, Secretary,
West Kentucky Coal Operators' Association,
Starks Building,
Louisville, Kentucky.

MR. C. K. NEEKAMP, Secretary,
Northeast Kentucky Coal Association,
Gaylord Building, Corner 16th and Greenup Avenue,
Ashland, Kentucky.

APPENDIX C

STATISTICS OF PRODUCTION OF COAL IN KENTUCKY IN 1923.
Prepared by U. S. Geol. Survey.

State and County	Loaded at mines for shipment (net tons)	Sold to local trade and used by employees (net tons)	Used at mines for steam and heat (net tons)	Made into coke at mines (net tons)	Total quantity (net tons)	Total value	Average value per ton	Number of Employees			Total	Average number of days worked
								Underground		Surface		
								Miners-a	All others			
(Eastern District)	2,575,670	44,986	38,630	.....	2,659,286	\$ 6,820,000	\$2.56	2,691	1,362	786	4,839	140
Bell	143,024	5,840	6,008	.....	149,472	298,000	1.99	187	53	37	277	207
Boyd	136,925	11,515	700	.....	209,140	470,000	2.25	298	129	81	508	131
Breathitt	122,153	25,430	277	.....	147,860	369,000	2.50	182	93	63	338	160
Carter	180,583	4,180	300	.....	187,063	330,000	1.79	197	112	65	374	165
Clay	2,968,898	27,459	39,014	.....	3,035,371	7,984,000	2.63	2,475	1,424	860	4,759	137
Floyd	8,268,535	55,640	46,756	.....	8,381,110	23,491,000	2.74	4,951	2,582	1,737	9,280	185
Harlan	630,458	10,682	17,691	.....	658,831	2,400,000	3.64	4,697	289	186	1,172	133
Johnson	340,389	2,796	9,967	.....	343,185	827,000	2.41	132	63	42	237	206
Knoxi	496,854	4,133	120	.....	501,107	1,274,000	2.58	631	256	209	1,096	133
Laurel	11,835	.....	.....	.....	108,512	257,000	2.37	225	74	53	352	126
Lee	58,526	.....	486	.....	11,838	21,000	1.78	52	24	15	91	48
Letcher	4,263,937	50,931	55,100	.....	4,369,968	138,000	2.34	74	35	21	130	129
McCreary	862,772	14,587	2,400	.....	879,759	12,527,000	2.87	2,573	1,243	807	4,623	167
Martin	412,560	4,000	8,022	.....	421,172	2,246,000	2.55	2,000	374	164	1,415	142
Morgan	25,088	4,065	2,933	.....	32,086	944,000	2.24	200	115	63	400	161
Perry	4,990,754	27,346	3,933	.....	6,022,033	148,000	4.61	105	27	85	195	231
Pike	5,724,969	69,915	3,933	.....	5,893,637	12,661,000	2.52	3,900	1,576	1,032	5,908	164
Whitley	471,538	10,462	78,614	.....	5,497,677	15,273,000	2.50	3,474	2,216	1,522	7,212	166
Other counties b.	2,310	1,800	15,687	.....	4,110	11,000	2.68	10	303	202	1,369	100
Total	82,856,297	372,700	321,238	230,318,933	780,553	\$90,198,000	\$2.66	24,177	12,390	8,048	44,585	161

(a) Includes also loaders and shot firers.
(b) Owsley and Wayne counties.

(Continued on next page)

STATISTICS OF PRODUCTION OF COAL IN KENTUCKY IN 1923—(Continued)

State and County	Loaded at mines for shipment (net tons)	Sold to local trade and used by employees (net tons)	Used at mines for steam and heat (net tons)	Made into coke at mines (net tons)	Total quantity (net tons)	Total value	Average value per ton	Number of Employees			Total	Average number of days worked
								Underground		Surface		
								Miners-a	All others			
(Western District)	31,284	1,953	4,376	.....	37,613	\$109,000	\$2.90	181	99	54	334	100
Christian, Crittenden, and Hancock	98,152	20,890	4,950	.....	119,982	244,000	2.03	90	43	28	170	170
Daviess	284,894	68,988	12,240	.....	366,122	866,000	2.37	399	178	77	654	130
Henderson	2,529,690	140,455	46,632	.....	2,716,777	5,437,000	2.00	2,091	871	762	3,724	124
Hopkins	65,011	2,900	6,730	.....	67,940	134,000	1.97	165	70	66	301	61
McLean	3,728,624	180,061	68,050	.....	3,976,725	8,249,000	2.07	3,580	1,620	679	5,870	125
Muhlenberg	943,993	17,216	38,478	.....	994,687	2,065,000	2.08	1,152	410	186	1,748	171
Ohio	1,188,215	30,496	45,302	.....	1,264,013	2,874,000	2.27	904	406	191	1,501	171
Union	1,317,317	9,155	19,948	.....	1,346,420	3,045,000	2.26	1,163	489	272	1,924	120
Webster	10,187,180	471,394	231,705	.....	10,890,279	23,023,000	2.11	9,734	4,186	2,306	16,226	127
Total	43,043,477	844,094	552,943	230,318,447	\$113,221,000	\$2.53	33,911	16,546	10,354	60,811	152	152
Total All Kentucky Wagon mines served by rail	106,485	.....	.....	.....	106,485	321,000	3.01	.....	.....	.....	.....	.....
Grand Total	43,149,962	844,094	552,943	230,318,447	\$113,542,000	\$2.54	33,911	16,546	10,354	60,811	152	152

(a) Includes also loaders and shot firers.
Statistics compiled by L. Mann.

INDEX

A.		C.	
Allegheny Formation.....	57	Caldwell County, Ky.....	93
Allegheny Mountains	15	Calhoun	67
Alma Seam	69, 96	California	36
Amburgy Seam	96	Campbellsville, Ky.	91
American Federation of La- bor	31	Carolina, Clinchfield and Ohio R. R.	109
American Rolling Mill Co.	122	Charley, F. D.	35
Analyses, Kentucky Coal....	60	Carter County Ky.....	74, 91
Analyses, Mine samples	67	Carter County Operators.....	114
Appalachian Basin	97	Casey County, Ky.	91
Appalachian Region	3	Caseyville Formation	96
Appendix "A"	155	Catron Formation	93
Appendix "B"	157	Central City, Ky.....	29
Ashland, Ky.	35	Chatteroy	29
Ashley, G. H.	93	Chemical Analyses of Coals 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, ..	89
Atlantic	12	Cherokee Indians	5
B.		Chicago Exposition	39
Barboursville, Ky.	4, 35	Chickasaw Indians	5
Bath County, Ky.....	15	Child Labor Law	33
Beattyville, Ky.	35	Christain County, Ky., 85, 93,	157
Beaver Creek, Ky.....	49	Cincinnati, Ohio	35
Bell County, Ky. 8, 40, 43, 67, 69, 70, 71, 72, 91	112	Cincinnati Arch	91
Bell County Operators	112	Cincinnati & Ohio Railroad Co.	23, 35
Benham	45, 52, 68	Cincinnati Southern Railway, 35	
Bibliography, Ky. Coals, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153		Cincinnati, New Orleans, Texas and Pacific R. R. 109	
Big Sandy River	23, 91	Civil War Depression	25
Big Sandy Valley	94, 109	Clark, Governor	22
Big Stone Gap	35	Clay County, Ky.....	67, 74, 91
Blue Gem Coal	101	Clay County Operators.....	114
Blue Grass Coal Co.....	46	Clifton Mines	41
Bourbon County, Ky.....	15	Clifton County, Ky.....	91
Bowling Green, Ky.	36	Clinton Furnace	16
Boyd County, Ky.	73, 91, 113	Clover Fork	21
Breaks of Sandy	7	Coal, Discovery of	1
Breathitt County, Ky. 68, 73, 74, 91, 97, 113		Coal Development	37, 38
Breathitt Formation	95	Coal Fields in Kentucky....	92
Breckinridge County, Ky.....	93	Coal Forming Period	2
British Thermal Units	97	Coal Handling	51
Bucket Tipple	53	Coal Mining	48
Buckhorn	68	Coal Mining Methods.....	43, 54
Buena Vista Furnace.....	16	Coal Mining Corporations, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134	
Butler County, Ky.....	85, 93		
Bryson Formation	93		

Coal Production	37, 38, 99
Coal Production of Districts	102, 103
Coal Produced in Kentucky	104
Coal Produced by Fields.....	104
Coal Valuation	107
Coke Manufacturer	41
Conemaugh	59
Conemaugh Group	96
Consolidation Coal Co.....	58
Cornett Seam	97
Correlation of Kentucky Coals	95
Crittenden County, Ky.....	85, 93
Crump, M. H. Colonel.....	36
Cumberland Gap	7
Cumberland Mountains	20, 57, 93
Cumberland Plateau	43
Cumberland River	23, 100
Cuttaway, (Kentucky).....	10
D.	
Daviess County, Ky.....	99, 130
Dean Seam	97
Dixon Formation	96
Drift Mining	97
Dutch Lamps	27
E.	
Eastern Kentucky	155
Eastern Kentucky Coal Field	45, 93, 109, 112
Edmonson County, Ky.....	86, 93
Elkhorn Coal Field.....	58, 59
Elkhorn Seam	62, 96
Elliott County, Ky.....	91
Estill County, Ky.....	91
Evansville, Indiana	20
F.	
Falls of the Ohio.....	6
Fidelity Coal Co.....	43
Filson, John	12, 14
Fireclay Seam	62, 97
Flag Coal	98
Flag Seam	97
Fleming, Kentucky	30
Floyd County, Ky.....	45, 62, 75, 91, 96
Floyd County Operators	114, 116, 117
Ford Motor Co.....	62
Fountainebleau	13
Frankfort, Ky.....	16
Freeburn Seam	62, 96
G.	
Geological Survey	32
Geology of Coals	91
Gist, Christopher.....	9, 10, 12, 35
Glenn, L. C.	96
Goose Creek	67
Grayson County, Ky.....	93
Green River	20
Greenup County, Ky.....	75, 91
H.	
Hall, Jas.	15
Hance Formation	93
Hancock County, Ky.....	86, 93, 130
Harding, President	31
Harlan County, Ky.....	40, 44, 45, 67, 75, 76, 91, 97
Harlan County Operators	117, 118
Harlan Sandstone	94
Harlan Seam	62, 97
Hart County, Ky.....	93
Hazard Coal Co.	19, 63
Hazard District	60
Hazard Seam	62
Hellier Seam at Heller, Ky.	62
Henderson County Ky.....	57, 86, 93, 99, 130
Henderson, Ky.....	20, 23, 128
Herrin Seam	99
High Splint	62, 97
Hignite Formation	93
Hopkins County, Ky.....	40, 41, 56, 87, 93, 99, 130
Hopkins County Mine	131
Howell, R. E.	131(?)
I.	
Illinois	39, 105
Illinois Central Railroad.....	128
Isley, Ky.	55, 56
Indiana	39
J.	
Jackson Co.	40
Jellico District	100
Jellico Field	40
Jellico Region	29
Jellico Seam	97
Jenkins, Ky.	45
Jillson, W. R.	104
Johnson County	43, 77, 91, 96
Johnson Co. Operators	118
Johnson, J. E.	157
Johnston, J. Stoddard	7
K.	
Kellico Seam	97
Kentucky	63, 99
Kentucky Coal	63

Kentucky Coal Markets.....	33
Kentucky Coal Operators' Association	157
Kentucky Geological Survey	22
Kentucky Mineral Exhibit.....	36
Kentucky River	16, 23
Kentucky River, Middle Fork	67, 68
Kentucky River, North Fork of	12, 67
Kentucky River Valley	110
Kentucky Solvay Co.	115
Keokee Seam	97
Knott County	62, 77, 91
Knott County Operators.....	119
Knott, Gov. J. Procter.....	31
Knox County	67, 77, 91
Knox County Operators	119
L.	
L. & N. R. R. Co.....	128
La Salle	6
Laurel County	78, 91
Laurel County Operators.....	119
Laurel River	9
Lawrence County.....	78, 91, 120
Lee County	78, 91, 97, 120
Lee Formation	93, 94
Leonard Seam	97
Letcher County	40, 80, 58, 62, 67, 91, 96, 120
Leslie County	80, 91
Lewis County	91
Lexington & Big Sandy Railroad	23
Licking Valley Region.....	67
Lincoln County	91
Lisman Formation	96
Little Sciota River	1
Logan County	93
London, Ky.	43, 94
Louisville	33
Louisville, Henderson & St. Louis Ry.	128
Louisville & Nashville R. R.	35, 43
Lower Maribone Seam	97
Lower Thacker Seam.....	96
Loyal Land Company	6
Lynch, Ky.	45
M.	
McBride, James	12
McCreary County	40, 82, 91
McCreary County Operators	121
McLean County	87, 93, 99, 132
McLean, Wm. D.	20
McRoberts, Ky.	45
Madison County	81, 91
Madisonville, Ky	67, 128
Magoffin County	67, 81, 91
Maine	36
Marion County	91
Martin County	82, 91
Martins Fork	44
Maryland	62
Mather, Wm. Williams	16, 22, 23
Mattewan	29
Menifee County	82, 91
Michaux, Francois Andre.....	18
Michigan	39, 62
Middlesboro, Ky.	36, 39
Miller's Creek	43, 96
Mine Samples	67
Mingo County	29
Mingo Formation	93
Mining Methods	54
Mississippian Period.....	3
Morgan County	40, 83, 91
Morgan County Operators.....	121
Monticello, Ky.	91
Mount Savage Furnace	16
Mud River Mine	23
Muhlenberg County	40, 88, 93, 99, 132
N.	
Neekamp, C. J.	157
Newburg, Ky.	67
Nicholson Coal Co.	128
Nisbett Mines	127
North East Coal Co.	43
Number 11 Coal	61
O.	
Ohio.....	39, 57, 60, 62, 105
Ohio County	40, 88, 93, 133
Ohio Land Co.	9
Ohio River	16, 91
Ohio Valley	15
Oldtown	9
Owen, David Dale	22
Owingsville, Ky.	15
Owsley County	83, 91
P.	
Paleozoic	2
Paleozoic Era	91
Pennsylvania	60, 62, 63, 105
Pennsylvania Coal	64, 99
Perry County	40, 62, 67, 68, 83, 91, 97, 110

- Perry County Operators 121, 123
Peter, A. M. 58
Pike County
 29, 40, 62, 84, 91, 96
Pike County Operators
 123, 124, 125
Pine Mountain 57, 93
Pine Mountain Fault 78
Pineville 35
Pineville Gap 67
Pittsburg Coal 36
Pond Creek Section 62
Potomac River 9
Pottsville Conglomerate 8
Pottsville Formation 57
Powell County 84, 91
Powell, Gov. Lazarus W. 22
Proctor, John R. 31, 32
Production of Coal 91
Providence, Ky. 135
Pulaski County 84, 91, 109
Pulaski County Operators.. 125
- Q.
- Quicksand, Creek, Coals of.. 67
- R.
- Rafenesque, C. S. 18
Rank of Eastern Counties.. 112
Ravenna 34
Reed, J. C. 157
Reinecke Coal Co. 61
Renecky Coal Co. 1
Rockcastle County, Ky...84, 91
- S.
- Shaler, N. S. 31
Shamrock Mine 50
Southern Railroad 109
Splint Coal 62
Springfield Seam 99
St. Bernard Coal 106
St. Bernard Power Plant... 129
Star Furnace 16
Stinking Creek 68
Straight Creek Seam 97
Stripping Operation 94
Sunlight Coal Mine ii
Sunlight Coal Mine 11
- T.
- Taylor County, Ky. 91
Tennessee 57
Thacker Seam 62
Three Forks, Kentucky
 River 67
- Todd County, Kentucky..... 93
Topographic Sheets 155
Total Operators in Ken-
 tucky 134
Transylvania University 18
Tradewater River 23, 67
Trimble, David 20
Tug Fork 9, 91
Tug Fork Section 29
- U.
- Union County, Ky.
 89, 93, 99, 133
United Mine Workers..... 31
United States Bureau of
 Mines 67
United States Geological
 Survey 93
Upper Cumberland Coal
 Field 67
Upper Thacker Seam 96
- V.
- VanLear 43, 44, 62, 96
- W.
- Walker, Dr. Thos. 12
Walker, Dr. Thos., Dis-
 covery 6
Wallen's Creek Coal Cor-
 poration 44, 97
Warren County 93
Warr'or's Trail 1
Wayland, Ky. 45
Wayne County 40, 91
Webster County...68, 89, 99, 133
Weeksbury, Ky. 45
Western Colliers Co. 55
Western Coal Field
 57, 60, 93, 127, 130
Western Kentucky 155
Western Kentucky Opera-
 tions 128
West Virginia
 29, 31, 62, 63, 64, 94, 99, 105
Wheelwright, Ky. 45
Whitehouse, Ky. 43
Whitley County
 29, 40, 85, 91, 97
Whitley County Operators
 125, 126
Williamsburg 17
Williamson 29
Wisconsin 39
Wise Formation 94
World's Fair 36