DEVELOPMENT OF THE COAL INDUSTRY IN OKLAHOMA

By

LEE G. KNOX

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Oklahoma Agricultural and Mechanical College

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APPROVED BY:

George S. Corfield
Chairman, Thesis Committee

David C. Winslow
Member of Thesis Committee

Edward E. Keso
Head of Department

D. C. McIntosh
Dean of the Graduate School

PREFACE

Coal is today our most important source of energy. Scarcely any home can long exist without the use of coal directly or indirectly. Oklahoma is fortunate in having a large reserve in the state.

Coal, until the opening of the Mid-Continent oil field, furnished the largest income from mineral resources. Oklahoma ranks as sixteenth among coal producing states.

The purpose of this research has been to study the history and development of the coal industry, the physical features of the coal areas and the disposition of the mined coal.

The material for this thesis consists primarily of government and state data and of field studies made by the author. The author spent several days in the "Northeastern District" where he learned by first hand observation about the mining and greating of coal for market.

The writer wishes to express his gratitude to Professor George S. Corfield and to other staff members of the Department of Geography, to the Library staff, and to personnel of the State Planning and Resources Board and others at the State Capitol who ably assisted in procuring information.

For information concerning mining and mining operations the writer is indebted to Frank J. Podpechan, owner and operator of the Rogers County Coal Company, Sequoyah, Oklahoma and also the McNabb Coal Company, Catoosa, Oklahoma and the Sooner Coal Company, Oologah, Oklahoma.

L. G. K.

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CHAPTER I

INTRODUCTION

History And Early Development Of Coal

The first mention of coal in literature dates from the Fourth Century, B.C., but so rapidly has its use developed that it has become one of the most important among all energy sources and commercial commodities. Scarcely any home or industrial concern can exist without it directly or indirectly. Coal has not always enjoyed its enviable reputation it now has. As recently as the reign of Henry II of France it was considered so objectionable a fuel that the smiths in Paris obtained a special license or paid a fine for using it. Regulations against its use appeared in many of the cities of Europe during the Seventeenth Century, although it began to enter actively into trade in England about the Thirteenth Century. Mining did not, however, become very extensive until after the invention of the steam engine. Discovered in 1679, the first bituminous coal mining in America began in Virginia in 1787. The first recorded shipments of anthracite, discovered in 1762, date from about 1805. The earliest records of production of bituminous coal in this country began in 1820 when 3,000 tons were mined. Anthracite records a production of 22 tons in 1814. The million ton mark was reached for anthracite in 1837 but bituminous did not reach that amount until thirteen years later in 1850.[1]

Historians suggest that the Chinese knew coal, even though to a slight extent, before the Greeks, but the first definite mention of its utilization appears in Aristotle's Meteorology. Speaking of the combustible bodies he says:

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[1] E.S. Moore, Coal, Its Properties, Analysis, Classification, Geology, Extraction, Uses and Distribution, New York: John Wiley & Sons Inc., (1922), p. 1.

"Those bodies which have more of earth than of smoke are called coal like substances." Theophrastus, a pupil of Aristotle, and Pliny both mention this substance and its use by the smiths. They undoubtedly refer to the brown coal variety, which came from Thrace in northern Greece and from Liguria in northwestern Italy. Thus, it became known to the ancients as Thracius lapis and gemma Samothracia, while "jet", which came from Lycia in Asia Minor, was called Gagates after a river in that region.

The word "coal", as now used, derived its meaning from the Saxon "col", but it was always spelled "cole" in English until sometime in the Seventeenth Century when, "coal" then referred to "charcoal" as of the present usage. At the present time the term "coals" commonly has two meanings, one refers to glowing fragments of some combustible, the other to the different varieties of the material known in a general way as "coal".[2]

As a major factor in world history, coal dates only from the Eighteenth Century. Many factors account for its "coming of age", most important of which include: (1) the depletion of the forest and the threatening scarcity of fuel—wood and charcoal—and of building material, especially for the shipbuilding industry; (2) the epoch-making discovery in 1708 of the practical application of coal to the smelting and manufacturing of iron; and (3) the perfection of the steam engine by James Watt at the beginning of the fourth quarter of the eighteenth century. The discovery meant the release of the iron industry from its dependence on charcoal. The effect of the steam engine is too complex for accurate appraisal in a few sentences. However, its importance to industrial production can be reached along two major lines.

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[2] Ibid, p.2.

In the first place, it made possible the expansion of mining operations, for it solved the problem of water control and ventilation in coal mines and permitted deeper shafts and more economical exploitation. Until then only surface or near surface seams could be worked, and (they were) generally in such a way as to jeopardize the future exploitation of enormous underlying coal deposits. The steam engine also aided in underground hauling, hoisting, and land transportation of mineral products.[3]

In the second place, the steam engine brought about phenomenal increase in the demand for mineral products. Cheapening coal cheapened energy and, consequently, anything made with the aid of mechanical energy. Furthermore, it revolutionized transportation by land and sea and, in so doing, incredibly enchanced the usefulness, and immeasurably extended the market, of coal. Made of iron or steel, the steam engine itself depends on coal for both its manufacture and operation. The scarcity of wood drove one shipbuilding country after another to turn to metal, first iron and then steel, and in both cases coal proved indispensable. For decades, moreover, the ships that scoured the Seven Seas to being Europe food for her workers and feed for her machines were eager to carry coal on their outbound voyages, the one heavy bulk commodity moving away from northwestern Europe. Coal thus became the center pillar of British maritime supremacy, and throughout the Nineteenth Century made history as no other commodity has done.

When the iron ore of Lorraine joined the coal of the Rhur through the Treaty of Frankfurt,the foundation of the most powerful industrial empire ever built on the continent of Europe was laid; and coal again wrote history

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[3] Erich W. Zimmermann, World Resources and Industries, New York; Harper and Brothers Publishers, (1933), p. 451.

which man will never forget so long as the story of the great World War lives. The history of the United States is railroad history. The iron and steel rails and the locomotives, are unthinkable without the coal industry. Today as the major source of energy it keeps the wheels of the railroads moving; not only that, but coal also furnishes the railroads with their largest single item of revenue freight. Thus coal is the backbone of America's land transportation system, as it was, throughout critical decades, of the water transportation system upon which rests the British Empire.[4]

Reserves And Estimated Life

As a result of a geological reconnassance of the world's coal reserves in 1913 they were estimated at 7,397,000,000 metric tons (2,204.6 pounds per metric ton); of this vast amount, approximately 69 per cent occurs in North America; over 17 per cent in Asia; and about 11 per cent in Europe; two percent in Oceania and the remaining one per cent in Africa and South America.

TABLE I

Estimate of Coal Reserves of the World by Continent, 1913*
(In Million metric tons of 2,204.6 pounds each)

Continent	Class "A" Anthracite and some semi-bituminous	Class "B" & "C" Bituminous coals	Class "D" Subbituminous coals, brown coals, and lignite	Total
North America	21,842	2,239,683	2,811,906	5,073,431
South America	700	31,379	— —	32,097
Europe	54,346	693,162	36,682	784,190
Asia	407,637	760,098	111,851	1,279,586
Africa	11,662	45,123	1,054	57,839
Oceania	659	133,481	36,270	170,410
Total	496,846	3,902,944	2,997,763	7,397,553
United States	19,684	1,955,521	1,863,452	3,838,657

*H. M. Hoar, The Coal Industry of the World, Trade Promotion Series No. 105, Bureau of Foreign and Domestic Commerce, United States Department of Commerce, (1930), p. 15.

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[4] Ibid, pp. 451-2.

The above estimates of coal reserves of the world give no allowance for coal at present unremoveable, nor for loss of coal in mining (Table I).[5]

TABLE II

World Production of Coal and Lignite*
(Thousands of Metric tons)

Continent	Tons
North America[1]	15,238
United States[2]	561,544
South America[3]	4,614
Europe[4]	818,377
Asia[5]	81,139
Africa[6]	26,382
Oceania[7]	17,871
Total world known production 1947	1,525,165
Total world estimated 1947 production	1,639,000

Data not available for some countries, latest production data available given below.

1. Greenland 8 (1946).
2. United States (Anthracite only) 54,891 (1946).
3. Argentina 7 (1945), Peru 230 (1946), Venezuela 4 (1946).
4. Denmark 2,300 (1946), Erie 216 (1946), Sweden 488 (1946), Yugoslavia 1,600 (1942).
5. Formosa 1,200 (1946), Syria 2 (1945).
6. Belgian Congo 102 (1946), Madagascar 3 (1945), Portuguese East Africa 16 (1946).
7. Victoria5,799 (1946).

*W. H. Young, R. L. Anderson, and E. M. Hall, "Coal--Bituminous and Lignite," Minerals Yearbook, (1947), Preprint from Bureau of Mines United States Department of Interior, (1949), pp. 334-336.

At the present rate of annual consumption the coal supply within 6,000 feet of the earth's surface would last for more than 6,000 years.[6]

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5 H. M. Hoar, The Coal Industry of the World, Trade Promotion Series No. 105, Bureau of Foreign and Domestic Commerce, United States Department of Commerce, Washington D. C., (1930), p. 13.

6 Isaac Lippincott, Economic Resources and Industries of the World, D. Appleton and Company, New York, (1932), p. 137.

United States Reserves

The United States has a reserve of 3,838,657,000,000 metric tons of coal. In 1946, the United States mined 561,544,000 metric tons.[7] The length of time of mining coal in the United States like those of the world are subject to many things; chief among which include substitutes which can be used in its place. Many possible sources of power include water, the tides, the sun, oil, natural gas, wood and possibly atomic energy.[8]

Oklahoma Reserves

The coal area, located in the Interior Province, Western Region, embraces parts of the states of Iowa, Missouri, Nebraska, Kansas and Oklahoma. The coal area of Oklahoma comprises 12,000 square miles, which according to estimates of the United States Geological Survey contain 79 billion tons of coal.[9] The estimated life of the reserves in Oklahoma at the present rate of mining reaches 6,000 years. The coal beds which are now worked, include the largest and most accessible found. Production in this state from the time of the earliest records to 1946 totals 148,870,000 tons.[10]

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7 W. H. Young, R. L. Anderson, and E. M. Hall, "Coal--Bituminous and Lignite," Minerals Year Book, (1947), Bureau of Mines, U.S.D.I. (1949), p. 274.

8 Isaac Lippincott, op cit., p. 137.

9 Edward E. Dale, and J. L. Rader, Readings in Oklahoma History, Row Peterson and Company (1930), New York, p. 784.

10 W. H. Young, R. L. Anderson, and E. M. Hall, op cit., p. 274.

CHAPTER II

GEOLOGY OF THE COAL FIELDS OF OKLAHOMA[1]

The amount and area of coal in Oklahoma served as factors in promoting early legislation in Washington for the establishment of statehood. The coal seams in Oklahoma underly an area of 20,000 square miles of which 12,000 are estimated of economic importance or an area slightly greater than the state of Maryland (10,577 square miles). All of the coal was deposited in horizontal seams within the Pennsylvanian geologic formation. The depth of the coal varies from surface outcrops to a depth in excess of 1,200 feet. Oklahoma has at least seven beds of workable coal and several beds too thin to be considered of value. The workable beds range in thickness from two to six feet and in places reach seven or eight feet.[2] The maximum aggregate thickness where average conditions exist totals about 20 feet. Except in a few places, there are only one to three beds available in a given area. The average thickness of the beds in the main part of the field approximates four feet. Detailed studies of the coal formations and the economic value have been made under the supervision of the United States Geological survey and the Oklahoma Geological Survey. The greater portion of the Oklahoma coal is classified as the bituminous variety with the exception of a small region in the eastern part of the state which is considered of semi-bituminous or semi-anthracite character due to the Quachita disturbance which was effective as far west as a point about 50 miles within Eastern Oklahoma.[3]

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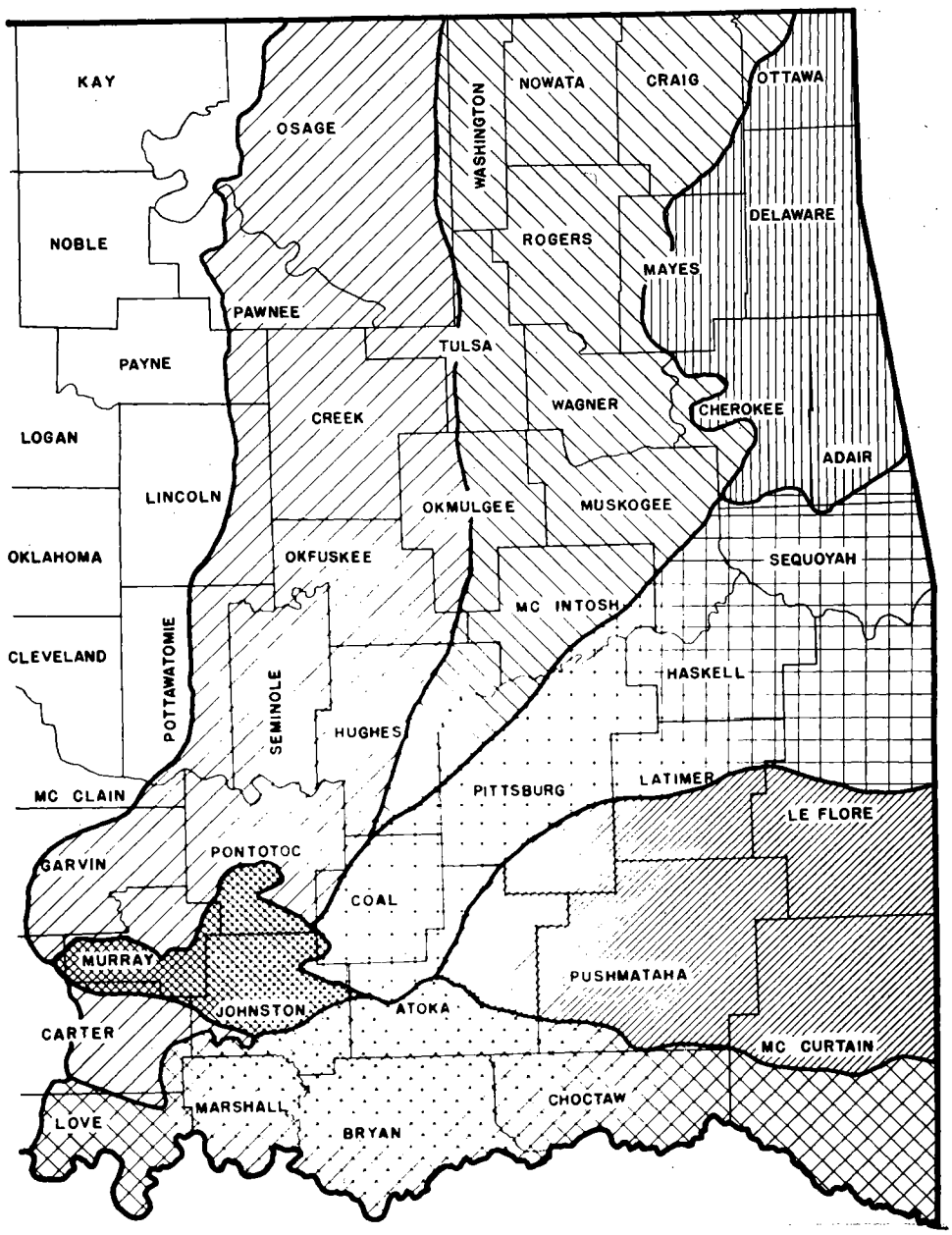
1 Much of this chapter has been taken from C. L. Cooper (ed), Coal In Oklahoma, Oklahoma Geological Survey Bulletin No. 4, Norman, (1926), pp. 31-102.

2 Mineral Resourses, Division of Industrial and State Planning, (1946), p.57.

3 J. A. Taff, "The Southwestern Coal Fields," 22nd Annual Report, Part III, United States Geological Survey, U.S.D.I. (1902), p. 367.



PHYSIOGRAPHIC REGIONS
EASTERN OKLAHOMA

AFTER SNIDER

- RED RIVER
- SANDSTONE HILLS
- PRAIRIE PLAINS
- LOWER ARKANSAS VALLEY
- RED BEDS
- OZARK MOUTAINS
- OUACHITA MOUNTAINS
- ARBUCKLE MOUNTAINS

FIGURE 1

Physiography

The area of extensive coal deposits in Oklahoma lies almost entirely within the Prairie Plains province physiographic region which borders the Ozark Mountains region. The extreme southwestern corner of the area, comprising Coal, Pittsburg, and parts of Latimer, McIntosh, and Okmulgee counties falls within the Sandstone Hills region (Figure 3). The Arkansas and Canadian rivers and their tributaries drain the area, except a small part, (Coal County) where the tributaries of the Red River receive the excess water. About 2,000 feet range of elevation appears in the coal fields area. The lowest point, less than 400 feet above sea level, is on the Arkansas River where it crosses the Oklahoma-Arkansas line. It contrasts with the highest point, Cavanal Mountains west of Poteau, with altitudes over 2,300 feet.[4]

Geologic Coal Bearing Formations

The coal bearing formations consist chiefly of sandstone and shale with some limestone, especially north of the Arkansas River. The author gives consideration to only those formations which contain coal. The correlation of these formations is shown in table III.

The Pennsylvanian rocks cover the greater part of the eastern one-third of the state. The lower members of the series are the great coal, oil, and gas bearing horizons of Oklahoma, even though some workable coal and good production of oil and gas occur well up in the series. The Arkansas River divides the area of Pennsylvanian rocks into two sub-divisions. South of the Arkansas River the rocks consist mostly of sandstones and shales, while north of the river many limestones are found.

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[4] J. E. Moose and V. C. Searle, A Chemical Study of Oklahoma Coals, Oklahoma Geological Survey Bulletin No. 51, (October, 1929), pp. 5-8.

The area of Pennsylvanian rocks north of the Arkansas River include all of Washington, Nowata, Rogers, Wagoner, and Osage counties, plus the greater part of Craig, Mayes, and Tulsa counties. The formations exposed in this area east of Osage county follows from the base up (Table III).

TABLE III

Geological Formations of Coal Producing Areas*

South-central & Southeastern Oklahoma	Northeastern Oklahoma	
	Nowata shale	
	Altamont limestone	
Seminole conglomerate	Bandera shale	
Holdenville shale	Oologa Lime- Pawnee limestone	Pennsylvan-
Wewoka formation	Broken stone	ian
Wetumka shale	Arrow	
Calvin sandstone	Formation Labette shale	
	Ft. Scott lime-	
	stone	
Senora Formation		
Stuart shale and		
Thurman sandstone		
Boggy shale		
Savanna sandstone	Cherokee formation	
McAlester shale		
	Winslow formation	
Hartshorne sandstone	with Bluejacket	
	sandstone at base	
Atoka formation*	Upper	
Wapanucka limestone*	Middle Jackfork sandstone	
Upper	Lower	
Caney shale		
Lower		Mississipp-
Stanley shale		ian
		Ord., Sil.
Talihina chert		Dev.
Stringtown shale		Ordovician

*C. L. Cooper (ed) Coal in Oklahoma, Oklahoma Geological Survey Bulletin No. 4, Norman, (1926), p. 64.

The formation known as the Fort Scott lies above the Cherokee shales in a series of limestones and shales, with a single sandstone of prominence, and two or more beds of coal.

The Nowata shales, a formation with a few interstratified sandstones, has at least one bed of coal which is one of the most persistent stratigraphic features. Outcrops occur frequently near Collinsville where mining takes place, as well as, in the vicinity of Coal Creek and near Dawson. It is usually called the Dawson Coal. The coal seam from 20 to 30 inches thick, extends far southward past the Arkansas River.

Pennsylvanian Coal Strata south of the Arkansas River area contains the greater part of the principal coal beds. The area begins at the Arkansas River and extends south to the Arbuckle and Ouachita Mountains, and west from the Arkansas line to the Red Beds (Figure 2). A part of the Red Beds are also of Pennsylvanian age. A small area of Pennsylvanian age south of the Arbuckle Mountains known as the Ardmore district contains a little coal, although not at present of commercial importance.

The principal area of the Pennsylvanian rocks includes all or part of the following counties: LeFlore, Latimer, Haskell, Muskogee, Okmulgee, Tulsa, Creek, Pawnee, Payne, Lincoln, Pottawatomie, Garvin, Pontotoc, Seminole, Okfuskee, Hughes, McIntosh, Pittsburgh, Coal, and Atoka.

In Arkansas, beds of considerable thickness occur in the Atoka formation, but in Oklahoma, these beds usually thin out and become inconspicuous. The McAlester formation contains four beds of workable coal and a number which develop eventually. The Savanna contains at least three workable beds, the Boggy formation two, and one in the upper part of the Senora, mined at Henryetta, Schulter, and Morris. The southeastern part of the area occupied by rooks of the Muskogee group where the strata appear extensively folded, and in certain places faulted. A series of anticlines and synclines have their axes extending in a northeast-southwest direction.

In South-central and southeastern Oklahoma the Atoka formation outcrops over a large area in the valley of Clear Boggy Creek, in the northwestern part of Atoka County and southern Coal County, this formation extends in a belt of varying width along the north side of the Choctaw fault to the Arkansas line. It contains some coal too thin for profitable exploitation.

The Hartshorne sandstone ranks economically as the most important formation on account of its association with the best and most valuable coal beds over a large part of the field. The coal lies directly above the sandstone, with a thin parting of shale, and even in some places this shale parting is cut through and the two coals join in one seam. The formation varies in thickness from 100 to 200 feet.

The McAlester shale consists of a great series of shales and sandstones with an estimated thickness of 2,000 feet. The total thickness of the shales is nearly ten times that of the sandstone. The formation of the McAlester quadrangle has been divided into three parts for convenience of discussion by Taff; (1) the lowest division is composed almost entirely of shale with thin sandstone and coal, and has a total thickness of 800 feet. The Hartshorne coal occurs at the base of this shale, or just above the Hartshorne sandstone; (2) the second division of the formation consists of three or four beds of sandstone seperated by 100 to 200 feet of shale. The total thickness approximates 5,000 feet. The lowest of these sandstones reaches a thickness of almost 200 feet where it caps Belle Starr Mountain and the ridge northwest of Hartshorne; (3) the upper division consists almost entirely of shale, about 700 feet in thickness, with the McAlester coal 50 feet above its base. Several thin beds of coal also occur in the sandstones, but none have been found of sufficient thickness to be classed as workable. The three divisions of the

McAlester formation are represented on the Arkansas side of the state line.[5]

McAlester coal occurs from 1,200 to 1,500 feet above the Hartshorne coal. The bed has an outcrop length of 70 miles in the southern part of the district. The coal varies in thickness from four and one-half feet in the west end of the district to about three feet in the east, and contains no shale partings. It is of high quality, mines well, and is a good steam coal.

Two beds of coal occur within the McAlester shale in the stratigraphic position of the McAlester coal as it is known in the Dow, Alderson, Krebs, and McAlester districts in the western part of the Choctaw coal field. These coals, separated by about 50 feet of shale, lie from 600 to 800 feet below the top of the formation. A number of sandstone beds lie below the coal forming low ridges or hills, acting as excellent horizon markers for determining the position of the coal.

Stigler Coal lies in the area directly south of the junction of Canadian and Arkansas rivers. It occupies approximately the same position geologically as the McAlester coal, but it has not been determined definitely whether it represents the exact equivalent. In this region there is but one coal bed of any considerable value and the chief bed, thinner than the McAlester coal in the vicinity of McAlester, has a thickness of less than 50 inches. The coal lies in a basin, the axial part of which extend in a northeast-southwest direction. The coal is inclined toward the center of the basin at angles from two to ten degrees at the outcrop. The coal is of good quality, well suited for mining, and at no place in the district lies at a great depth. The coal low in ash content contains on the average less than one per cent sulphur.

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[5] J.A. Taff, op. cit., p. 380.

The Winslow formation occurs in Oklahoma, in northern Haskell and LeFlore counties, and eastern Muskogee county. To the south the Winslow dips beneath the surface in the deep trough of the Arkansas Valley. The formation is divided into three parts, the Hartshorne sandstone, the Atoka formation, and the McAlester shale. Its thickness is about 1,100 feet. The formation consists of bluish clay shale, brown sandstone, and thin beds of coal.

Cavanal coal named for Cavanal station on the Frisco Railroad, occurs in the eastern part of the field in the northern part of LeFlore County. The coal outcrops at the foot and almost entirely around the Cavanal Mountains, with a dip six to ten degrees toward the center of the Mountain. The bed varies in thickness from two to three and one-half feet, with exceptions, it is generally very free of impurities. Although the coal contains considerable sulphur it makes excellent fuel for steam and domestic purposes.

In the Cavanal syncline the coal outcrops a little more than 100 feet beneath the series of the sandstone beds which make a line of prominent ridges surrounding the base of the mountain. The Cavanal coal, as far as known, varies from three to three and one-half feet in thickness, and is well situated structurally for mining.

The Boggy shale formation, named from Boggy Creek in the Choctaw nation, possesses a thickness of bed varying from 500 feet in the Muskogee district to more than 2,000 feet in the McAlester district. The formation consists largely of shales with some sandstones, interspersed with a few limestone beds. The Boggy shale has one coal bed, about two feet six inches in thickness, located about 400 feet above the base of the Boggy shale.

Witteville coals are contained in two beds separated by about 250 feet of shale and sandstone. The upper Witteville coal, is three feet ten inches thick, and separates into nearly equal benches by a thin parting of shale.

This coal, mined at intervals since 1894, reaches the main line of the St. Louis and San Francisco railroad at Poteau over a branch road belonging to the mining company.

The lower Witteville coal, four feet eight inches thick, separates into three benches by two variable bands of bone and carbonaceous shale. The lower coal occurs at the top of the Savanna formation while the upper bed lies in the lower part of the Boggy shale, or about 800 feet and 1,000 feet respectively, above the Cavanal coal. The Witteville coal beds are not known outside of the Cavanal syncline. The area of each of the Witteville coal beds in the Cavanal syncline covers nearly 60 square miles.

Structure

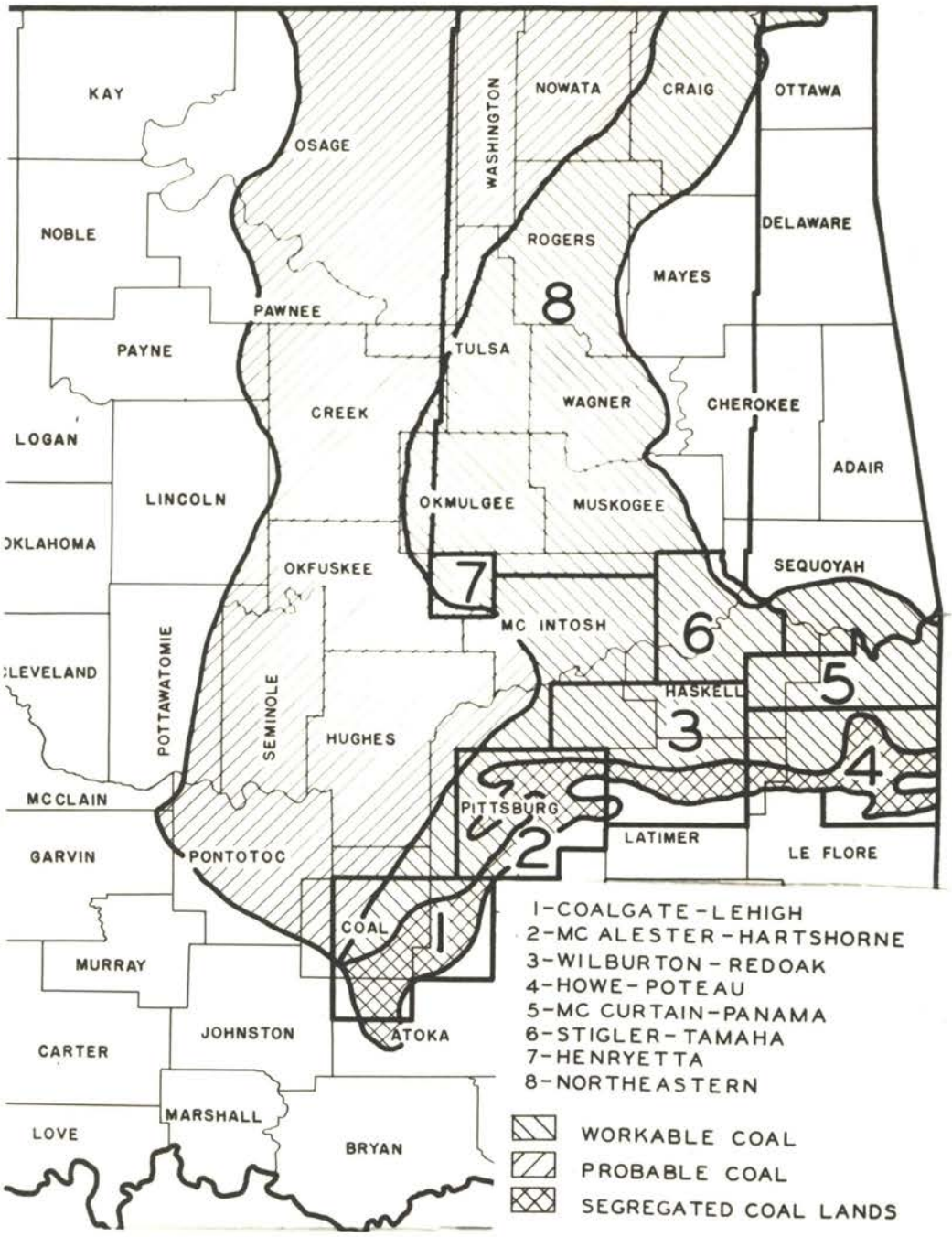
The Oklahoma coal fields throughout the east-central area present well defined structural features. In part, the coal beds lie practically level or with a gentle dip to the west or southwest, which is the normal dip for any part of the state. For example, in the Henryetta district the average inclination of the coal dips about 20 to 40 feet per mile. In the part of the field south of the Canadian River the area, characterized by broad, low folds, increases in intensity from the north to the south as the series approaches the much faulted and folded Ouachita Mountain region. Some faulting has occured north of the Choctaw fault, as is evidenced by the off-sets in the coal outcrop or by the displacement of the anticline which extends north and east from Bokoshe into Arkansas.

The structural folds in the coal fields possess characteristics of such a nature that the rocks broken along the axes of the upward folds, have been attacked by the agents of erosion and readily brought about a rapid cutting down

of the surface along the axes of the anticlines. At the present time many of the anticlinal axes are indicated by the valleys, while the synclinal axes lie in the hills and mountains. Originally the coal beds extended over the entire area between the present outcrops but because of these erosional features, they have disappeared from the area of the anticlinal folds and, in some cases, are well down toward the axes of the syncline. The coal beds of the state, as they are today, lie in synclinal basins. The coal dips from the outcrops toward the center of the basin, and the depth of the coal below the surface increases rapidly. The inclination of the beds vary from practically level, well down in the synclinal basin, to an angle of 90 degrees as found in some of the outcrops and small mine openings not only in the region of Blanco, between Haileyville and Edwards, but also in the vicinity of North McAlester. In many places dips of 60 to 80 degrees are common. Sharp folding and faulting is also shown along the axes of the McAlester anticline. From the vicinity of Carbon eastward, the Hartshorne coal dips northward 45 to 90 degrees, but northward from the outcrop of the Hartshorne coal the dip increases rapidly (15 to 30 degrees) on the outcrop of the McAlester coal. The McAlester coal lies in such a position that it can be profitably mined in a small basin which pitches at a low angle toward the west, to the northwest of Carbon. Pressure, resulting from folding, badly crushed the coal at the Richville mine. From McAlester westward, a fault extends parallel with and very near the axis of the fold upon the north side displacing the Hartshorne coals. Outcrops of these beds occur at intervals along the fold, but as a whole, the rocks including the coal have been displaced downward with respect to the beds on the southside.

Description Of Coal Seams By Districts

The McAlester district embraces an area of 477 square miles in Pittsburg,



OKLAHOMA COAL DISTRICTS

FIGURE 2

Atoka, and Latimer counties. This district lies entirely within the Arkansas Valley geomorphic province except for the northwest corner which is crossed by the western most cuesta of the Osage Plains Province (Sandstone Hills sub-region).[6]

Four beds of workable coal occur in the McAlester district namely; the lower Hartshorne, the upper Hartshorne, the McAlester and the Secor. The deepest bed represents the lower Hartshorne, workable throughout most of the district. It averages about four feet in thickness, but in the Wilburton District, in one or two tracts, it has a thickness of six feet.

The upper Hartshorne bed, workable only in the Wilburton District, where it has a thickness of four feet of clean coal, occurs about 50 to 60 feet above the lower Hartshorne.[7] The upper Hartshorne varies in thickness from two to four feet.

The McAlester bed lies from 1,200 feet to 1,300 feet above the upper Hartshorne and generally varies in thickness from three to four feet, but in few instances it reaches a thickness of five feet.

The Secor bed lies in a shallow basin above the McAlester bed south west of the city of McAlester. Considered the same age as the Witteville and Jones Creek coals, it varies in thickness for two to two and a half feet, and usually lies at low angles of dip close to the surface, facilitating easy stripping.

Of the four beds of workable coal that characterize this district--the upper and lower Hartshorne, the McAlester, and the Secor; the upper and lower

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6 T. A. Hendrick, "The McAlester Districts," Geology and Fuel Resources of the Southern Part of Oklahoma Coal Fields, United States Geological Survey, Bulletin No. 874C, U. S. D. I., (1939), pp. 1-9.

7 J. E. Moose and V. C. Searle, op. cit., p. 8.

Hartshorne lie 50 to 60 feet apart in the base of the McAlester Shale. The upper coal averages four feet, while the lower varies from two to four feet. The McAlester, in its usual position above the Hartshorne, averages four feet or better in thickness. The Secor varies from two, to two and one half feet in thickness and has been extensively stripped.[8]

The Wilburton District, a large coal production area since 1890, produces coal of a Medium Volatile Bituminous Rank.[9]

Yields come from three beds of coal in the Wilburton District, namely; the lower Hartshorne, the upper Hartshorne, and the McAlester. Only the Hartshorne beds are workable. The McAlester, on account of its thinness, is considered unworkable under present conditions, and the deepest bed, the lower Hartshorne, lies from the outcrop to 1,000 feet beneath the surface. The upper Hartshorne lies 60 to 90 feet above the lower Hartshorne, and the McAlester about 1,300 feet above the upper Hartshorne.

The upper and lower Hartshorne beds reach their greatest development in this district. The upper beds averages three and one half to four feet in thickness, and in some extreme cases even reaches five feet in thickness. In contrast the lower beds average four to five feet thick, in one or two places reaching a thickness of six feet. As a rule these two beds are about six feet apart, vertically, but in one or two places they approach close enough to be mined as one bed. These beds lie at dips varying from 10 to 60 degrees, though the average ranges from 15 to 20 degrees. The coal produced from these beds

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8 Ibid., p. 8.

9 T. A. Hendrix, "The Howe-Wilburton District," Geology and Coal Resources of the Southern Oklahoma Coal Fields," United States Geological Survey Bulletin No. 874D, U. S. D. I., (1939), pp. 265-279.

finds ready use mostly for railroad steam purposes and more recently, has proved satisfactory as bunker coal.

The so-called Stigler Coal Field, located in Haskell County, Oklahoma, embraces 39 square miles and the nearest point approaches to about one mile from Stigler, the county seat.

The coal bed in the field varies from 22-30 inches in thickness and, from indication at or near the crop, lies from 18 to 60 feet below the surface. It consists of clean bright coal which by analysis proves an excellent quality of blacksmith coal, which ranks with the best in Oklahoma.[10]

Seven seams of coal characterize the Howe-Poteau District--the lower Hartshorne, the two McAlester coals, the Cavanal and the two Witteville coals. In the Howe division of this district the only beds found include the two Hartshornes, and the two McAlesters. Of the four, the lower Hartshorne is the most extensively worked. In the southern part of the Poteau division, the Cavanal bed lies some distance above the McAlester beds, whereas in the northern part of the Poteau division the Witteville beds lie some distance above the Cavanal coal.

The lower Hartshorne in the Howe division, varies from three to five feet in thickness and averages about four feet of clean coal, with a dip from eight to twenty degrees.

The upper Hartshorne, unworked in the Howe division due to its thinness, where it does not reach greater thickness than three feet, approaches this thickness only occasionally. The upper Hartshorne does not outcrop in the Poteau division and is not considered workable because of its extreme depth.

Thinness precludes the working of the McAlester beds in the Howe division.

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[10] J. E. Moose and V. C. Searle, op. cit., p. 9.

They do not outcrop in the Potosu division and are considered unworkable because of their depth.

The Cavanal coal from two and one-half to three feet in thickness, outcrops along the foot of the Cavanal Mountain, with a dip which varies from six to ten degrees.

The two Witteville coals outcrop in the Cavanal Mountain about 1,400 feet above the horizon of the McAlester seams. These beds are located about 200 feet apart, vertically, the upper of which is about three feet ten inches thick over all, with only a thin parting of shale or bony coal from one-fourth to one-half inch thick above the center of the seam. The lower section carries a seam about four feet, four inches in thickness over all the area.

Two beds of coal occur in the McCurtain-Massey District--the Jones Creek and the Panama.

The Jones Creek coal occurs in the Massey division and it is also called the Massey and Blocker coal. Although harder, cleaner, and containing fewer partings, geologists correlate this with the same coal as the Witteville in the Howe-Potosu District. While not possessing such a high quality as the coals in the McAlester District, it still is considered a very good coal.

The Panama coal occupies about the same stratigraphic position as the Hartshornecoals. It varies greatly in thickness and structure, as some places exhibit seams of clean coal seven feet in thickness, whereas within a short distance it frequently divides into two benches of coal by a shale band generally in the center of the seam from six inches to two feet thick. Other places carry seams only three feet six inches to four feet in thickness. At McCurtain the coal is extremely faulty, which not only adds to the difficulty and expense of mining, but also makes it difficult to identify. The Panama coal is excellent inquality, soft in character as compared with the McAlester and Wil-

burton coals. It also makes a good coke for bee-hive ovens.

The Lehigh-Ardmore District embraces an area of 400 square miles in Atoka, Coal, and Pittsburg Counties in southeastern Oklahoma.[11] Two seams of coal characterize this district, namely; the Atoka and Lehigh. The Lehigh bed, which furnishes nearly all the coal mined at Lehigh and Coalgate ranges in thickness from four to five feet, with an overall average of about four feet. Generally clean and relatively free from persistent bands, this coal has been mined for many years at Lehigh, Coalgate and Phillips. The Atoka coal underlies the Lehigh about 1,200 feet. It is quite variable in character and ranges in thickness from two to three feet, in a few places five feet, while in others it is overlain and frequently cut over by a bed of soft black shale, which ranges in thickness from three to five feet, and causes difficult and expensive underground mining. The future may prove the Atoka seam to contain valuable coal, workable with both steam shovels and by underground operations.

One of the most intensively mined districts in the state, the Henryetta District, includes an area about ten miles square.[12] The coal mined in this district, known as the Henryetta coal bed, has been traced from this district north through Okmulgee, Tulsa, across the northwestern corner of Wagoner, across Rogers, and Craig counties to the Kansas line known as the Cherokee coal in northeastern Oklahoma. This bed may correlate with the Weir-Pittsburg bed of southeastern Kansas.

Thinness of the coal bed presents the only disadvantage in mining in this

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11 M. M. Knechtel, "The Lehigh District," Geology and Fuel Resources of Southern Oklahoma Coal Fields, United States Geological Survey Bulletin No. 874B, U. S. D. I., (1937), pp. 91-93.

12 J. E. Moose and V. C. Searle, op. cit., p. 9.

district, otherwise conditions for recovery of the coal approach the ideal.

The northeastern part of the State possesses three extensive beds of coal of economic importance. The lowest bed lies near the top (50-75 feet) of the Cherokee shale and varies from 1-40 inches in thickness with average thickness of 18-22 inches. For the most part this coal, hard and black, makes an excellent domestic and steam coal. The coal continues from the southern border of Kansas southwest across Craig, Rogers, Mayes, Wagoner and Okmulgee counties and appears to correlate with the same coal as the Henryetta bed.

The next highest bed of coal, known as the Fort Scott, found below the Fort Scott limestone in the upper part of the Cherokee shale, outcrops from the Kansas line southwestward to the Arkansas River and for a few miles west of the outcrop of the Cherokee-Henryetta bed. This hard and black coal varies from a thin seam of black slaty coal a few inches in thickness to a maximum of 21 inches. In places there occurs what is known as "red" coal.

The Dawson coal considered the highest coal of commercial importance in this part of the State outcrops at a point just west of Nowata, and extends southwest through Collinsville and east of Tulsa to the Arkansas River. Recognized as good quality the coal varies from 12 to 18 inches in thickness.

CHAPTER III

EVOLUTION OF THE COAL INDUSTRY IN OKLAHOMA

Early History Of Oklahoma Coal Mining

Even though a small amount of coal had been dug and used in the blacksmith shops and for other local needs before the Civil War, coal did not, however, become accessible for commercial development until the coming of the railroads.

J. J. McAlester claims the credit for being the one who first realized the possibilities of developing the coal fields. Living at Fort Smith, in 1865, McAlester saw the memorandum book of a geologist who had been a member of a government exploring party that traversed the Indian Territory many years before the Civil War. The best coal was to be found at the "Cross Roads", where the Texas Trail from Springfield, Missouri, to Preston and Dallas crossed the California Trail from Fort Smith to Albuquerque. Acting upon this knowledge, McAlester went to the "Cross Roads" where he established a store and soon became the owner of a flourishing business. By his subsequent marriage to a Chickasaw girl he became entitled to citizenship in the Choctaw Nation.[1]

As soon as the coming of the railroad made the coal of commercial value, McAlester and other Choctaw citizens formed a company and began to develop the mines in that region. Under a provision of the Choctaw Constitution, permission was granted to citizens who should discover any mineral, the exclusive right to own and work the mines for the distance of a mile in every direction from the point of discovery. Many of the Indians hired geologists to establish a good location in the center of a workable coal field.

The importance of the mining operation increased very rapidly with the

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1 Angie Debo, The Rise and Fall of the Choctaw Republic, University of Oklahoma Press, Norman, (1934), pp. 117-127.

building of new railroads and the subsequent discovery and opening of new mines. In 1887--Fifteen years from the opening of the first commercial mine-the out put of Choctaw coal was estimated at over five hundred thousand tons.[2]

The Building of Railroads And Their Effect On Coal Production

Expanding westward, the railroad companies wanted roads to cross Oklahoma from Texas to the junction of the east-west lines in Kansas, to carry the cattle from that state to the markets. On July 25, 1866, Congress passed a law providing that of the three specified Kansas railroads the one that should first reach the boundary of the Indian Territory should be allowed the right-of-way, and a conditional grant of every alternate section in a ten mile strip on each side of the track.[3]

Immediately upon the passage of the act, the three railroads began a race for the border. The Union Pacific, Southern Branch (Missouri, Kansas, and Texas) reached the line, June 6, 1870. The company completed the line into Texas in December of the same year.

At first the railroads burned wood, but after 1872, when the coal of the McAlester region was brought to the attention of the Missouri, Kansas and Texas officials by J. J. McAlester, they turned to the cheaper and better fuel. The railroads provided the earliest market and the greatest market for the newly developed coal fields.[4]

After the opening of the coal fields and the first railroad into Oklahoma, a rail net spread over the eastern coal fields which connected the outcrops of

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[2] Ibid., p. 119.

[3] Ibid., p. 117.

[4] Fredrick L. Ryann, The Rehabititation of Oklahoma Mining Communities, University of Oklahoma Press, Norman, (1935), p. 27.

the proven coal fields.

By 1905, the principal coal carrying roads had completed their lines within the state. The names of the railroads with the mileage (branch lines to the mines are not included in the mileage) in Oklahoma are given below.

TABLE IV

Railroads Carrying Coal In Oklahoma*

Railroad	Mileage
Atchison, Topeka and Santa Fe, including 100 miles of Gulf Colorado and Santa Fe	914
Chicago, Rock Island and Pacific	1,345
Fort Smith and Western	200
Kansas City Southern	143
Midland Valley	258
Missouri, Kansas and Texas	695
Kansas, Oklahoma and Gulf	128
St. Louis and San Francisco	1,498
Total	5,231

*C. L. Cooper, (ed.) Coal in Oklahoma, Oklahoma Geological Survey, Bulletin No. 4. Norman, (July 1926), p. 62.

The Missouri, Kansas and Texas was completed to McAlester in 1873. In 1878 the Choctaw, Oklahoma and Gulf opened the coal fields between McAlester and Fort Smith. The St. Louis and San Francisco crossed the eastern part of the Territory in 1895, followed by the Kansas City Southern in 1898. In 1899 a branch of the Choctaw, Oklahoma and Gulf extended from the main line at Hartshorne to Ardmore, and followed the coal beds for fifty miles. This gave another outlet, in addition to the Missouri, Kansas and Texas for the Coalgate district, and resulted in the opening of a large number of mines. Sometime later a branch of the Santa Fe was built to Lehigh and the Santa Fe soon acquired an interest in the Coalgate coal fields. In the late 1890's branches of the Choctaw, Oklahoma and Gulf, and of the Missouri, Kansas and Texas were extended along the coal outcrops from Dow to Wilburton, opening fields in Latimer county. Shortly after

1900 the Fort Smith and Western and the Midland Valley railroads were built through coal fields at McCurtain and Panama respectively thereby opening Haskell and LeFlore counties to mining. In 1903 the St. Louis and San Francisco extended its lines through the Henryetta coal fields which became an important coal producer.[5]

TABLE V

Bituminous Coal Loaded For Shipment By Railroads In Oklahoma, As Reported By Mine Operators, In Net Tons, In 1946*

Route	Net Tons
Chicago, Rock Island and Pacific	187,011
Fort Smith and Van Buren	60,595
Kansas City Southern	22,438
Kansas, Oklahoma and Gulf	10,775
Midland Valley	251,005
Missouri, Kansas and Texas	88,583
Missouri Pacific	241,139
Oklahoma City, Ada and Atoka	261,791
Pittsburg County	2,914
St. Louis-San Francisco	1,405,374
Total	2,531,625

*W. H. Young, R. L. Anderson, E. M. Hall, "Coal, Bituminous and Lignite," Minerals Yearbook, Bureau of Mines, U.S. Dept. Interior, (1947), p. 284.

In 1946 the total tonnage of coal produced, amounted to 2,826,766 tons, of which 2,531,625 tons were hauled by railroads, showing the importance of the coal industry upon that of the railroad industry. Most of the coal carried by the railroads was used as fuel for their operation. The St. Louis-San Francisco carried 1,405,374 tons, making it the largest carrier of coal in Oklahoma (Table V).

Segregated Indian Coal Lands

About the year 1900, one-half million acres of coal lands, chiefly in the

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[5] Ibid., pp.26,27.

Choctaw Nation of what was then Indian Territory, were segregated or set apart for the benefit of the Choctaw and Chickasaw Indians. The segregation was done before the Indians took up their allotments as a result of the Atoka Agreement made effective on April 23, 1897.[6] The Atoka Agreement furnished the basis for the later Curtis Act which established that all minerals were to be reserved for the benefit of the tribes.[7]

The United States Geological Survey surveyed the Indian coal lands and completed the job in 1904. After the allotment of lands to individual tribal members had been completed by the Dawes Commission in 1906, these coal lands remained as a possession of the Choctaw tribe under the supervision of the Department of Interior. A stretch of territory about 150 miles in length and 15 miles in width and containing five hundred thousand acres was thenceforth known as the Segregated Indian Coal Lands.[8]

The treaty provided that the Government was to sell the land in 960 acre tracts. The land was offered for sale in August, 1904. All bids were rejected and a second attempt was made to sell the land, but with the same result. Much of the segregated land has been leased to individuals and companies which are operating mines on these lands. A royalty of eight cents per ton is paid the Government for the benefit of the Indians, the value of which varies from $250,000 to $300,000 per year.[9]

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6 E. E. Dale and J. L. Rader, Readings in Oklahoma History, Row, Peterson, and Company, Evanston, Illinois, (1930), p. 641.

7 Ibid., p. 641.

8 C. L. Cooper (ed.), Coal in Oklahoma, Oklahoma Geological Survey Bulletin No. 4, Norman, (1926), P. 102.

9 Ibid., p. 103.

Congress made provisions in 1948 to pay the individual tribe members for the coal lands that had been withheld by the government. The first of the payments is expected to be made by July 15, 1949. The total amount of the money for payment for the coal lands is $8,500,000.[10]

TABLE VI

Coal Production In Oklahoma*
1880 - 1948

Year	Tonnage	Value $
1880	120,947	
1881	150,000	
1882	200,000	
1883	196,000	
1884	448,000	
1885	500,000	750,000
1886	534,580	855,328
1887	685,911	1,286,328
1888	761,986	1,432,972
1889	752,832	1,323,807
1890	869,229	1,579,188
1891	1,091,032	1,897,037
1892	1,192,721	2,043,479
1893	1,252,110	2,235,200
1894	696,606	1,541,293
1895	1,211,185	1,737,254
1896	1,366,380	1,919,115
1897	1,336,380	1,787,358
1898	1,381,466	1,827,638
1899	1,537,424	2,199,785
1900	1,922,300	2,788,224
1901	2,421,781	3,915,268
1902	2,820,666	4,265,106
1903	3,517,388	6,386,463
1904	3,046,539	5,532,066
1905	2,924,427	5,145,358
1906	2,860,200	5,482,366
1907	3,624,658	7,433,914
1908	2,918,116	5,976,116
1909	3,119,377	6,253,367
1910	2,646,226	5,867,947
1911	3,074,242	6,291,494
1912	3,675,418	7,867,331

(continued on next page)

10 The Daily Oklahoman, (June 11, 1949), p.5.

TABLE VI (Cont'd)

Coal Production In Oklahoma
1880 - 1948

Year	Tonnage	Value $
1913	4,165,770	8,542,748
1914	3,980,613	8,204,015
1915	2,693,580	7,435,906
1916	3,608,011	7,525,427
1917	4,385,844	12,335,413
1918	4,831,447	17,508,884
1919	3,802,113	14,544,901
1920	4,849,388	23,294,000
1921	3,362,623	15,546,000
1922	2,802,511	11,527,000
1923	2,885,038	10,874,000
1924	2,800,000	8,590,000
1925	2,406,174	7,667,000
1926	3,045,295	9,042,000
1927	3,335,095	11,570,000
1928	3,500,187	10,365,000
1929	3,641,455	11,481,000
1930	3,258,404	7,768,000
1931	1,980,424	4,614,000
1932	1,391,745	2,646,000
1933	986,904	2,616,000
1934	1,120,002	2,846,000
1935	1,107,823	2,879,000
1936	1,242,947	3,500,000
1937	1,327,741	3,841,000
1938	1,352,495	2,947,000
1939	1,063,212	2,503,450
1940	1,340,329	4,021,760
1941	1,650,012	4,700,104
1942	2,092,459	6,777,351
1943	2,866,422	8,945,354
1944	2,786,492	11,135,485
1945	3,100,928	10,487,300
1946	2,629,110	9,497,000
1947	2,826,766	
1948	3,420,152	

*Minerals, Oklahoma Plans and Resources, Division of Industrial and State Planning, (1946) pp. 68,69.

Factors In Oklahoma Coal Mining

Following the railroad expansion into Oklahoma, the state was settled quite rapidly. Most of the people that came into the new territory were farmers and

did not bring a market for the coal that was being mined at this time. Production, however, increased annually until 1893 when 1,252,110 tons were mined. That which was produced was used by the railroads that demanded an ever increasing amount of the mineral. The mining communities and cities that were built along the railroads purchased small amounts of coal.

Production of coal increased from 500,000 tons in 1885 to 1,252,110 tons in 1893 the last year of production without strikes. The first strike of union workers in the Oklahoma coal fields occured in the McAlester District. It was broken by the operators of the mines when production from other fields in the state opened. The result of the strike of 1894 was a reduction in wages for the laborers from $2.35 to $2.10 per day.[11]

In 1896 prices started to move upward and the miners began organizing under the pressure of the increased cost of living. The mines came under the Union for labor in 1898 after receiving a charter as District No. 21, United Mine Workers of America. The first action of the Union was to demand higher wages, resulting in a strike lasting from 1898 to 1903. Production was maintained and actually an increase was found for each of the years of the strike (Appendix A). In 1898 and 1899 more mines were opened in the McAlester district, while to the southwest, the Coalgate and Lehigh areas grew in importance. Strip mines were opened around Tulsa and in the northern counties. The rapid development resulted in severe competition in 1899 and 1900, and a demand on the part of the operators for a reduction in wages.[12]

Following the strike of 1903, the operators and miners began a new relationship resulting in increased production. New markets at home were found for the

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11 Fredrick L. Ryan, op. cit., p. 45.

12 Ibid., p. 47.

coal being produced which included coke plants in the McAlester district. The coke industry was a thriving industry prior to 1908. The production of coke in beehive ovens produced 54,781 tons in 1905, at maximum value of $227,542. The coke was sold as fuel. A total of 526 ovens were located in Howe, Alderson, Henryetta, Krebs, and Chant. The coke industry came to a sudden close in 1908 resulting from a loss of markets.[13]

The periodof 1903-1922, known to the coal miners of Oklahoma as the "Prosperous Years", experienced no strikes. The markets for the coal continued to increase, and the laborers worked under good conditions as mechanized equipment increased in the mines. Conditions of competition from the small producers were overcome by the machinery of the large producers. Industries began to establish themselves in the state. Among them was the cement industry. The cement industry decided to locate in Oklahoma to make use of the available coal, as E. C. Eckel points out;[14]

> "Every barrel (380 lbs.) of Portland cement marketed implies that at least 200-300 pounds of coal have been used in the power plant and kilns. In other words, each kiln in the plant will, with its corresponding crushing machinery use up from 6,000 to 9,000 tons of coal a year. The item of fuel cost is therefore highly important, for in the average plant about 30 to 40 percent of the total cost of cement will be chargeable to coal supplies."

The coal supplied to the cement industry came mainly from the Lehigh fields.

Production of coal in the larger mines was carried on under the Union, however, small wagon mines was being operated by individuals.

A number of reasons contribute to the unexpected revival of the small mines.

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13 H. G. Thuesen, Oklahoma Manufacturers, 1940, Oklahoma A & M College, Division of Engineering Publication, Vol. 11, No. 6, (April 1941), p. 9.

14 E. C. Eckels, "Cement Materials and Industries of the United States," United States Geological Survey, Bulletin 243, U. S. D. I., Washington, (1904), p. 40.

There was a surplus of miners in Oklahoma and labor was cheap. Five skilled men could be hired for about $12 a day. The underlying coal structure was so widespread and so near the surface in many places, that an experienced operator, with the investment of a few hundred dollars in labor and equipment could produce from ten to fifty tons of coal a day. With coal selling from $7.00 to $9.00 a ton to farmers within the McAlester district, and this market undeveloped and ignored by the large companies, it became possible for the small operator to dispose of his coal for a profit.[15]

The operation of the mines in Oklahoma increased production steadily until the greatest production of the state was reached in 1920. Labor in the mines was not as good as the overall picture would lead one to believe. The miners did not work the whole year, and immediately before World War I the miners worked approximately one-half time in Oklahoma fields.

Many reasons were given for the lack of steady work. Government mine inspectors put the blame upon mechanization of the mines, particularly upon the increased use of electric mining machines. The operators, on the other hand, pointed out that the railroads began to burn fuel oil in their locomotives after 1910, and that natural gas began to supply many domestic consumers who would otherwise have used coal. Operators also put the blame upon the miners by charging that their wages were so high that coal could not be sold in competition with the other kinds of fuel. They also maintained that a surplus of labor was unavoidable owing to the increase in population in the region, from the influx of immigrants from foreign countries and from the large families among the miners.[16]

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[15] Fredrick L. Ryan, op. cit., pp. 55-60.

[16] Ibid., p. 59.

World War I put an end to these incriminations temporarily. From 1917 to 1920 the employers were unable to get enough workers to man the mines. Day and night shifts failed to produce sufficient coal to satisfy the demand. The war years were a period of high wages for the miner and of prosperity for the Oklahoma coal communities. Regular wages were between $5.00 and $6.00 per day, and many skilled miners earned more. Large profits accrued during these three years. Many operators netted enough to pay for their investment in the mines besides having a large surplus.

The decline of the industry in this period began in 1921 when the price of coal dropped due to competition. The large and small mines were able to retain their markets but the middle sized producer (50 to 200 workers) was forced out of business. With the depression of 1929, the large mines faced financial difficulties. Railroads burned less coal, and the coal companies were unable to extend their markets to include the domestic consumer because they could not produce as cheaply as the small mines. They reduced wages, lengthened the hours of labor, and practiced drastic economy in supplies and in equipment maintenance to no avail. During 1929 the Osage Coal and Mining Company closed the last of its mines at Krebs, the Rock Island Mining Company shut down its mines at Hartshorne and all of the large companies closed down at Wilburton. Only the wagon mines and about seventy-five small mines, employing ten to twenty-five men each, remained in the McAlester field. At Henryetta, five large companies produced some coal, but they closed down eight months of the year.[17]

The possibility that fuel oil might become a serious competitor of coal was realized as early as 1915. By that time, oil burning locomotives had been

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[17] Ibid., p. 61.

VALUE AND PRODUCTION OF OKLAHOMA COAL 1880–1948

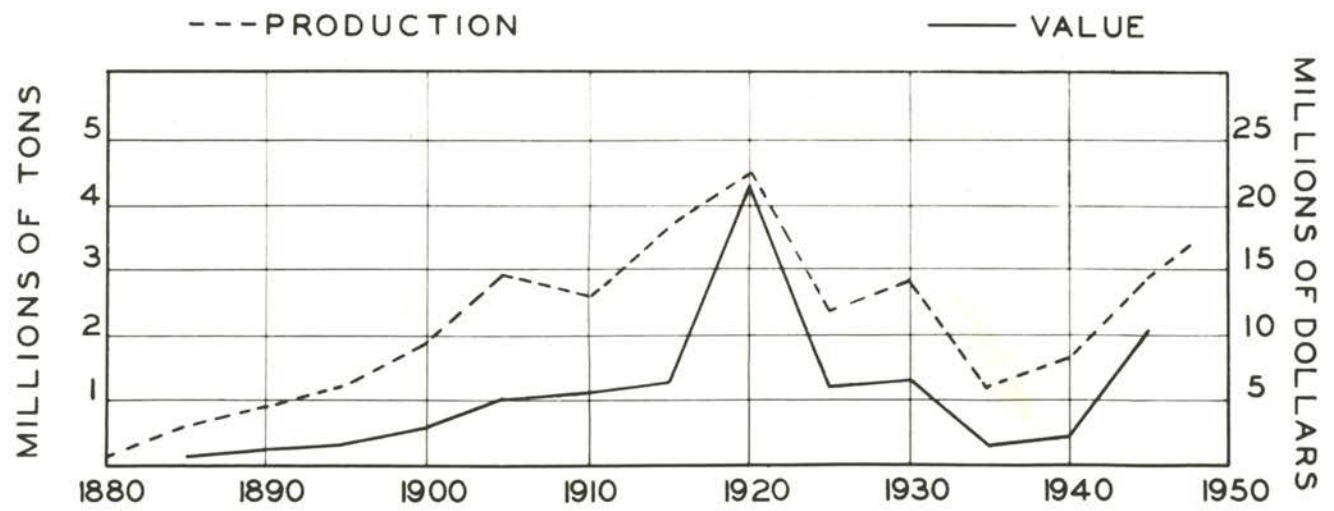

FIGURE 3

installed by the Missouri, Kansas and Texas and San Francisco railroads; nevertheless, 69 percent of all the coal produced in the state was used by the railroads. Their orders for coal continued to be large until 1927; but in that year the discovery of very productive oil pools in the Mid-Continent field lowered the price of fuel oil so much that it tended to replace coal. For motives of economy, therefore, the railroads substituted fuel oil for coal. [18]

The manufacturing plants in the cities followed the trend. In 1923 over 55 per cent of all Oklahoma's manufacturing plants operated by steam engines, most of which used coal produced within the state. It is doubtful whether more than 15 per cent of Oklahoma's primary power industries were supplies by coal in 1930. [19]

Another factor related to the decline of the coal industry in Oklahoma may be attributed to the rapid exploitation of the most available coal seams by methods that were cheapest to the employer.

The market for coal continued to flucuate, bearing upon the price charged by the miners and the traffic of the railroads. The competition of Kansas and Missouri for the markets of coal gave another factor that integrated against the Oklahoma mines.

Depression years of the early thirties further enhanced the decline of the coal industry. Large and medium operations were stopped and the small mine operators, with low overhead, continued as marginal producers. It was not uncommon at this time to find farmers stripping parts of their farms to sell to

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18 C. E. Lester, "Distribution on Consumption", Coal in 1915, Part B, United States Geological Survey, U.S.D.I., (Washington D.C.), (1916), p. 439.

19 C. R. Daugherty, A. H. Horton, and R. Y. Davenport, "Power Capacity and Production in the United States," Water Supply Paper 579, U. S. D. I., Washington, D.C., (1928), p. 60.

the local market.

Oklahoma coal fields suffered from the rail rates of the industrial cities of the midwest and could not compete effectively against companies of West Virginia, Ohio and Illinois. Fortunately, there is definite proof that this statement is true.

In the Spring of 1941, the City of St. Louis, Missouri, passed an anti-smoke ordinance. This made it necessary for many consumers who did not have smoke consuming equipment to burn smokeless bituminous coal. Such coal could be had either in West Virginia or in the Arkansas-Oklahoma fields.[20]

With the new ordinance, progressive freight officials of the Frisco Railroad decided they would try to secure some of this business for their road and the mines next to their right-of-way. To do this, they instituted on June 29, 1941, a rate of $2.00 per ton for coal moved in 2,000 ton lots, a cut of seventy-five cents per ton over the prevailing rate. Before this reduction less than 5,000 tons of Arkansas Valley coal has gone to this market in any single year. By the end of the year 1941, the St. Louis market for our coal jumped to 161,000 tons for that year and by 1942 this market consumed in excess of 250,000 tons annually from the Arkansas Valley. The coal, produced in District 14 of the Bituminous Coal division of the Department of the Interior, includes all the mines in Arkansas and in LeFlore, Haskell and Sequoyah Counties in Oklahoma.[21]

The loss of the state market for coal is found in a comparison of the use of fuels for generation of electric energy in the state for two years. Coal furnished 30.8 per cent in 1940 whereas only 20.4 per cent of the power for electric energy in 1943 (Table VII).

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20 "A Plan for Complete Development of the Arkansas Valley," State Planning Office, Oklahoma City, (May 1945), p. 25.

21 Coal Consumers Digest, Vol. III, No. 7, U. S. D. I., (August 1940), p. 5.

TABLE VII

Annual Consumption of Fuel for Generation of Electric Energy in the State[22]
By Types of Fuel - 1940 and 1943

Year	Bituminous Coal (Short Tons)	Per Cent	Oil (Barrels)	Per Cent	Gas (Thous. of Cu. Ft.)	Per Cent
1940	254,716	30.8	199,551	6.9	11,867,313	61.9
1943	354,794	20.4	256,263	4.9	24,052,247	61.1

The production of coal again received the impulse of the World War II and production by marginal producers increased and strip mining operated on twenty-four hour shifts. Following the close of the war many of the marginal producers went out of business because they failed to compete with the larger companies which mine more cheaply with the equipment they have.

Present Situation

Coal production during 1948 was sufficient to meet all demands. Mining was well distributed throughout the year with the greatest amount of production in the months of September, October, November, December, and January.

A comparison for the operation of the mines for the past ten years appear in the accompaning table (Table VIII).

TABLE VIII

Comparative Figures For Previous Years*

Year	No. of Mines	No. of Men Employed	Total Tons Produced	Av. Days Worked	Av. Tons per Day	Fatalities
1939	121	2,651	1,062,212	102	10,830	8
1940	133	1,896	1,340,329	108	12,287	8
1941	158	2,269	1,658,012	125	12,156	6
1942	158	2,714	2,092,459	377	16,275	15
1943	130	2,693	2,856,422	488	17,090	14

(Continued on next page)

22 Power Resources of Oklahoma, Division of Industrial and State Planning, (May 1945), p. 42.

TABLE VIII (Cont'd)

Comparative Figures For Previous Years*

Year	No. of Mines	No. of Men Employed	Total Tons Produced	Av. Days Worked	Av. Tons per Day	Fatalities
1944	106	1,992	2,786,492	453	32,418	8
1945	104	2,435	3,100,928	173	17,924	17
1946	90	2,273	2,639,110	145	18,200	7
1947	102	2,147	2,826,766	127	22,258	5
1948	111	2,524	3,420,152	145	23,474	6

*Fortieth Annual Report of Mines and Mining of Oklahoma, Department of Chief Mine Inspector, (June 1948), p. 19.

One hundred and eleven mines operated in 11 counties during 1948 and produced 3,420,152 tons, the largest annual production since 1929 (Table VIII). of the coal produced, 710,046 tons was classified as lump, 305,668 tons as nut, 771,922 tons as slack and 1,632,516 as mine run. (Appendix A). Strip mining accounted for 2,270,668 tons and underground mining 1,149,484 tons. The daily average tonnage approximated 23,474 tons. During 1948, 2,524 men worked in coal mining operations, a year which averaged 145 working days. (Table VIII).

Operation of the coal mines was subject to weather conditions, especially in the strip pits. In the winter months icing and freezing weather prevented the full use of the equipment. The spring rainy season also resulted in work stoppage during the time the mines were drained.

The number of fatal accidents in the coal mines for 1948 totaled six whereas, there were 336 non-fatal accidents. Three of the fatalities resulted from rock fall, two electrocution and one a truck accident.[23]

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[23] Fortieth Annual Report of Mines and Mining of Oklahoma, Department of Chief Mine Inspector, (June 1948), p. 19.

CHAPTER IV

STRIP COAL MINING IN ROGERS COUNTY

The area within Rogers County has been a coal producer for many years. Farmers operated the first wagon mines in the area to provide domestic coal for the nearby cities and agricultural communities. The date of the opening of the first mine is not known but many of the old, shallow, strip pits were mined before statehood.

The era of modern mining did not actually begin in Rogers County until the large and medium mines were forced to close because of financial difficulties. When the large companies were forced to close, many of the operators were aware of the coal deposits in Rogers County and moved into the area with equipment to begin stripping operations. The expences of stripping operators is not as great as that encountered in the shaft mines. The stripping operators must lease the land, remove the overburden and then it is possible for them to get to the coal. In the shaft mining, expensive shafts must be sunk requiring timbers and many hours of labor before the coal can be mined. Another factor advantagious to strip mining over shaft mining lies in the economy of operation. During the period that the mines are not in full operation the companies underground operations must be carried on so that the mines will not flood. The strip pits contrast to this by using natural drainage when possible. Therefore suspended operations in the strip mining area is not as costly to the operator as suspended operations in the shaft and drift mines. The coal, mined in strip pits, is cleaned entirely from the floor of the pits yielding the maximum amount. The coal miners are forced in underground operation, to leave pillars to hold up the overburden. This adds to the economy of strip mining. The above listed were features favoring the strip mines over the shaft mines but there are also features of the shaft mines which surpass those of the strip mines. Among these

are theweather elements, rain, snow and flooding conditions are factors that prevent the steady mining of the coal. The strip mines are forced to remove the cover of the materials above the coal in order to get to it. Many times the coal dips out to a great depth or the natural coverage is so great that mining can not be carried on profitably. It is estimated by operators now that the maximum depth that coal can be stripped profitably is 35 feet removal of overhead to mine a vein of coal 18 to 22 inches thick.[1]

Adverse factors of both types of mining are the local faults that cause mining to become expensive and the thinning of beds to make the mining unprofitable.

Location And Occurence

To date there are in Rogers County two beds of minable coal, the Broken Arrow (Fort Scott Coal) and the Dawson coal.

The Broken Arrow coal seems to be continuous from the vicinity of Broken Arrow in Tulsa County to as far north as the strip pits north of Bushyhead. It is probably the same as the Croweburg coal of Kansas. The Broken Arrow coal has a reported maximum thickness of 27 inches in the vicinity of Broken Arrow where it is generally 18 to 24 inches thick, farther north it is thinner, being only 14 inches thick at some places between Sequoyah and Bushyhead.[2]

South of the Verdigris River the Broken Arrow coal has been stripped extensively and that part of the area is now producing an important quantity of relatively hard, black, bituminous coal which has long been prized as domestic

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1 Roy T. Cochran, Ground Foreman, Rogers County Coal Company, Sequoyah, Oklahoma, Personal Interview, (August, 1945.)

2 Malcom C. Oakes, Broken Arrow Coal And Associated Strata, Oklahoma Geological Survey Circular No. 24, Norman, (1944), p. 5.

and steam plant fuel. Operators report that this coal has good keeping qualities which permits stockpiling for seasonal and emergency use.

The coal north of the Verdigris River to the vicinity of Sequoyah is thick enough to be mined and has good fuel value but is too soft and breaks down to fine slack soon after mining.[3]

The following generalizations are used in a study of the Broken Arrow coals. The volatile matter tends to decrease slightly northward from 38.1 per cent in the vicinity of Broken Arrow to 33.8 per cent in the vicinity of Sequoyah and is 34.3 per cent north of Bushyhead. The fixed carbon increases from 50.8 per cent in the vicinity of Broken Arrow to 61.6 per cent near Sequoyah and is 59.2 per cent north of Bushyhead. The per centage of ash tends to decrease northward. The maximum is 9.4 per centsoutheast of Broken Arrow, the minimum 45 per cent in the vicinity of Catoosa. The sulphur content is erratic, the maximum is 3.6 per cent along the Rogers-Wagoner County boundry line. The minimum is 0.4 per cent in the vicinity of Catoosa and near Sequoyah it is about 0.9 per cent. The British Thermal Units increase as the impurities decrease. The maximum is 13,290 near Broken Arrow, and the maximum 14,170 near Sequoyah. At Catoosa the B.t.u. is 13,970.[4]

The Dawson coal seam, so named from the city of Dawson where it was first mined, continues northward toward Collinsville then north into Rogers County where it is mined near Cologah and Talala. Analysis of the coal is not available for the outcrops in Rogers County but from analysis made at Dawson and Collinsville the fixed carbon content decreases as the northern limit is reached, the ash content increases from 9.1 per cent in Dawson to 12.2 per cent near

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[3] Ibid., p. 15.

[4] Ibid., p. 24.

Collinsville and the sulphur content increases from 4.1 to 4.9 per cent from the Dawson pits to the Collinsville pits. From the comparison of the two an indication may be that the content of ash, and sulphur increases and the B.t.u. decrease, the B.t.u. is 15,010 near Collinsville.[5]

Physiography

All of the area of Rogers County lies in the Prairie Plains region of the Osage physiographic section (Map 3).[6] Elevations of the county vary from 850 feet in the northern part of the county to 684 feet in the southern portion. Drainage is mainly by the Verdigris River and its tributaries, draining from the north to the south and emptying into the Arkansas River near Muskogee. The topography is relatively hilly and the general dip of the formations is toward the south west. The general dip of the area is so small that flooding conditions are frequent. General relief results from differential erosion and may bring about special cases of relief up to 250 feet.

Operating Coal Companies In Rogers Counties

Rogers County has been the second largest coal producer of Oklahoma for the past two years. Production reached 480,663 tons in 1947 and 494,520 tons in 1946. The only county to exceed it was Okmulgee. A comparison of the labor conditions reveal that the supply of labor hired is exceeded by three other counties.[7]

Five companies operate in Rogers County, producing over 1,000 tons of coal

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5 J. E. Moose and V. C. Searle, A Chemical Study of Oklahoma Coals, Oklahoma Geological Survey Bulletin No. 4, Norman, (October, 1929), pp. 36,37.

6 N. M. Fenneman, Physiography of Eastern United States, New York, McGraw-Hill Book Co., Inc., (1938), p. 617.

7 Fortieth Annual Report of Mines and Mining of Oklahoma, June 30, 1948, Department of Chief Mine Inspector, (1948), pp. 12-17.

annually. They are well situated along the shipping points on two railroads (The St. Louis and San Francisco and the Missouri-Pacific). Of the five, three major operators produce a supply of coal over 25,000 tons annually. The Hague Brown and the Osborne Coal companies of Chelsea are marginal producers, producing seasonally for the local markets found in the near by towns. Whereas, the larger producers the McNabb Coal Company, the Rogers County Coal Company and the Sooner Coal Company (a subsidiary of the Seneca Coal Company) produce for both the railroads and the local markets. All the coal production in Rogers County is by strip mining.[8]

The McNabb Coal Company operates its office on the Frisco railroads at Catoosa. Operation by the company began about 1927 after the St. Louis and San Francisco surveyed a site for a spur line to the location of the coal fields. The railroad required enough coal reserve to last for 30 years of active mining.[9] The field that was mined included an area extending into the northern part of Wagoner County. The heavy demand for coal during the last War brought about mining of coal 24 hours a day and the area is now becoming too deep to mine profitably. Hence the McNabb Coal Company is at the present time installing their tipple and have leased land in Craig County to start mining in this area.

The Sooner Coal Company operates in the Dawson coal seam near Oologah on the Missouri-Pacific railroad. This company did not come into Oologah until 1942 to produce only for a short time in the shallow coal beds. Production by the company was stopped for a short time in 1949 because the leased land to be mined had become exhausted, however, more land was leased and the company still

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9 L. S. Robinson, Owner of Mine at Catoosa, Oklahoma, Personal Interview, (August 15, 1948.)

operates.[10]

The Rogers County Coal Company has been in operation since 1937 and is producing from the Broken Arrow coal. The coal that is mined is shipped to the tipple by company truck and is loaded on the St. Louis and San Francisco railroad for shipment.[11]

Operation Of A Typical Strip Coal Mine In Rogers County

The Rogers County Coal Company operates strip pits five miles north of the city of Claremore at Sequoyah. The tipple is on a siding of the St. Louis and San Francisco railroad. First coal mining began in the area in 1928 or 1929 by power shovel. Prior to that time the mining has been by the pick and shovel method.[12]

Operation of the company may be divided into the following subdivision; prospecting and engineering operations, mining operations, tipple operations, and sales.

Prospecting: The first task of the prospecting group of men, employed by the Rogers County Coal Company, is to find coal that can be mined profitable andto lease the property from the land owner for the company. This group consists offour men who survey and core drill the land to be leased to determine faults, the thickness of the bed of coal, its depth, dip, and the type of

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10 A. B. Shoemaker, Tipple Forman, Sooner Coal Company, Oologah, Oklahoma, Personal Interview, (August 15, 1948).

11 Frank J. Podpechan, Owner of Rogers County Coal Company, Sequoyah, Oklahoma, Personal Interview, (August 15, 1948).

12 J. H. Burrows, County Assessor, Rogers County, Oklahoma, Personal Interview, (April 17, 1949).

STRIPPING OPERATIONS
FIGURE 4

structure that is to be removed to reach the coal seam. This is important as future development and mining by the company depends upon their findings. Other jobs performed by the surveyors include road surveys for transportation. The coal that is found in this field was deposited in horizonal seams. Erosion has cut the topography into knolls that have the coal seams beneath them. Between the knolls the coal has eroded and has been carried away. Outcrops are frequent along the base of the knolls to serve as an index, but many have been eroded and have been covered by sediments carried sown from the overlying structure. The type of structure overlaying the coal is of special importance to the coal miners as the expense of mining increase as the rocks become harder. Most of the coal is covered by shale formations with occasional areas covered by limestone. Local faults must be determined; when the mining operations reach a fault and the coal is lost, expense becomes so great that mining is unprofitable.[13]

Mining Operations: The actual mining operations may be divided into the following divisions; blasting, stripping by shovel, labor crews, and loading and mining operations.

The blasting crew, composed of four men, set charges of powder to break the rocks overlying the coal so an electric shovel may pick up the broken rocks. The crew works with a four cylinder machine mounted on tracks that has a moving space of 12 feet from the point of contact to the end of the tracks. Augers are placed on the power take-off of the engine, and drill into the side of the hill that is to be blasted to 60 feet in length. This length is made possible by the augers made into ten foot sections that are added as the auger reaches the end of the track. After the hole is drilled, charges are placed in it to dislodge

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[13] Roy T. Cochran, (Interview), op. cit.

the rock. The charges that are used are specially made by the powder companies to perform the type of blasting operations required. Holes are drilled every ten feet along the face of the cut. After drilling the desired number of holes, the powder is placed, then discharged. The crew works ahead of the shovel usually as far as possible to be clear of the mining operations that take place behind.[14]

The shovel operation follows the blasting crew. The Rogers County Coal Company has two shovels removing the overburden of the coal, one an electric shovel and the other a diesel shovel. Both of the shovels are capable of removing ten cubic yards of material at a time, and are in operation for twenty-four hours a day, whereas the balance of the mine operates on the eight hour basis. Each eight hour working shift uncovers approximately an area of 60 feet forward and 40 feet in width.

Four men are required to operate each shovel on an eight hour shift, the operator, oiler, and two ground men. The operator is skilled and the highest paid man on the job. It is his duty to keep the shovel in operation as much as possible. A stop clock is mounted in the shovel showing the total amount of time that the shovel is not in continous operation. For each stop, to move up as the overburden is removed, the clock stops.

The oiler is the next man of importance in the shovel operations, he has charge of the operating machinery of the shovel. He must make sure that all working parts are in the best condition possible to insure against work stoppage. When the shovel stops operation to move forward, the oiler climbs the boom to oil and inspect the working mechanism against faults. He must be down

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14 Clinton Webber, Pit foreman of the Rogers County Coal Company, Sequoyah, Oklahoma, Personal Interview, (August, 1948).

by the time the shovel is in position to resume digging.

The ground crew is responsible for laying track for the shovel on which it moves forward. As the shovel progresses the crew takes up the track behind and sets it in front of the machine where it is used on the next move. The crew is also responsible for the cleaning up of the pit as the shovel digs. they have in their possession a small bulldozer that is used to scrape the debris back to where the bucket of the shovel can pick it up and remove it from the pits. Operations of machinery on the coal is helped by a thin protective covering of slate over the coal.

As the shovel moves forward and cuts into the facings of the hill, the material to be moved is placed in the cutting at the far side. In certain places in the field it is possible to see five cuts that have been made. The shovel is capable of mining until the coal gets to a greater depth than 35 feet. When this depth is reached the shovel is then moved to another location to start the removal of overburden over coal in that bed. The dip of the coal beds in the field is usually from one to two degrees and the shovel operator is usually aware of the drainage of the area. As cutting operations continue, the operator leaves the lower end of the pit open to allow natural drainage.

The actual mining operations follow the shovel. In this group the least skilled laborers work. In the actual mining operations three different functions are necessary before the coal is loaded onto the trucks for transportation to the tipple. The first operation includes clearing the surface of the coal, of slate and other foreign material. The small bulldozer, mentioned in the stripping operations, or a fresno pulled by a team of horses does the work. Following the cleaning of the coal surface, a special designed tractor breaks the coal seam into pieces. The tractor has a cement block weighing about 500 pounds with a spike adjusted to the length of the thickness of the coal. The

COAL TIPPLE
FIGURE 5

block is lifted into the air and when released breaks the coal for intervals of one yard.

Following the breaking operation the coal is then mined and loaded. The device used consists of an adapted machine, made for underground mines, but redesigned to operate in open pits. This machine is manned by an operator, and a helper sees, that the power lines keep clear of the machine. The machine, propelled by electricity, is mounted on tracks. It moves into the face of the seam. Iron claws on disks that are not centered, enable arms to bring the coal to the conveyor which drops it into a waiting truck. This electric loading device is capable of loading up to 30 tons of coal every three minutes. The machine removed the coal in one yard widths. This company operates one of four machines in the State, which together mine about 25 per cent of the coal output. The balance of the coal is loaded by conveyor onto the transport trucks.

Transporting the coal is one of the major features. Mines have to operate efficiently. The hopper type of truck transports the coal from the source of to the tipple. Coal companies, operating in the strip pits, make their own trailer bodies in their machine shops or contract with special trailer companies to have them custom made. Custom made in Bowata, Oklahoma, the trailers used by the Rogers County Coal Company, are designed with hopper bottoms which, when opened, drop the coal into the hopper at the tipple and make for rapid dumping with little human effort. International Harvester company trucks with a 10 ton carrying capacity are used to pull the trailers. The condition of the trucks are checked daily to make possible continous operation. Five trucks are used and six trailers are available. Constant loads in the trailers usually require one in reserve at all times.

Tipple Operations: Serve an important use in preparing coal for market. The tipple is used to grade the coal into size, wax it and load it into waiting

railroad cars.

The coal is conducted to the tipple from a hopper at the base by a conveyor belt. The coal passes from the conveyor to a grinding wheel used to crush the coal when small sizes are desired. After the coal passes the grinding wheel it falls on the shaker screens.

The tipple separates the coal into sizes by screening. The screens vary in size. The first screen over which the coal passes has the smallest mesh and as the coal progresses down the screens under gradient it is separated. The first screen extracts all coal 1/8 inch or less in size. This is called slack. The next screen extracts all coal from 1/8 inch to 1/4 inch called pea coal. The next removed is railroad stoker, size 1/4 to one inch. The next size extracted is that of nut or egg coal which may range from one to four inches. The last that passes over the screens contain lumps too large to be screened out previously. This is known as lump coal.[15]

The coal is shaken on tilted screens so it will pass from the higher to the lower levels. As it passes over the smaller screens the smallest coal is dropped out and is carried by waiting conveyors to the railroad car below. The larger coals are checked as they pass over the conveyor by a man to clean the coal of slate and other rocks in it.

As the coal is graded and put onto the conveyors it passes a small opening allowing only the coal to pass. As it passes this opening the coal can be oiled if the purchaser wishes to have waxed coal. Waxing of coal is merely oiling the outside surfaces. This process cuts down dust and gives a cleaner coal. Oil under pressure is sprayed from all sides of the opening to insure a complete coating. The waxed coal is sold for a higher price and mainly used by

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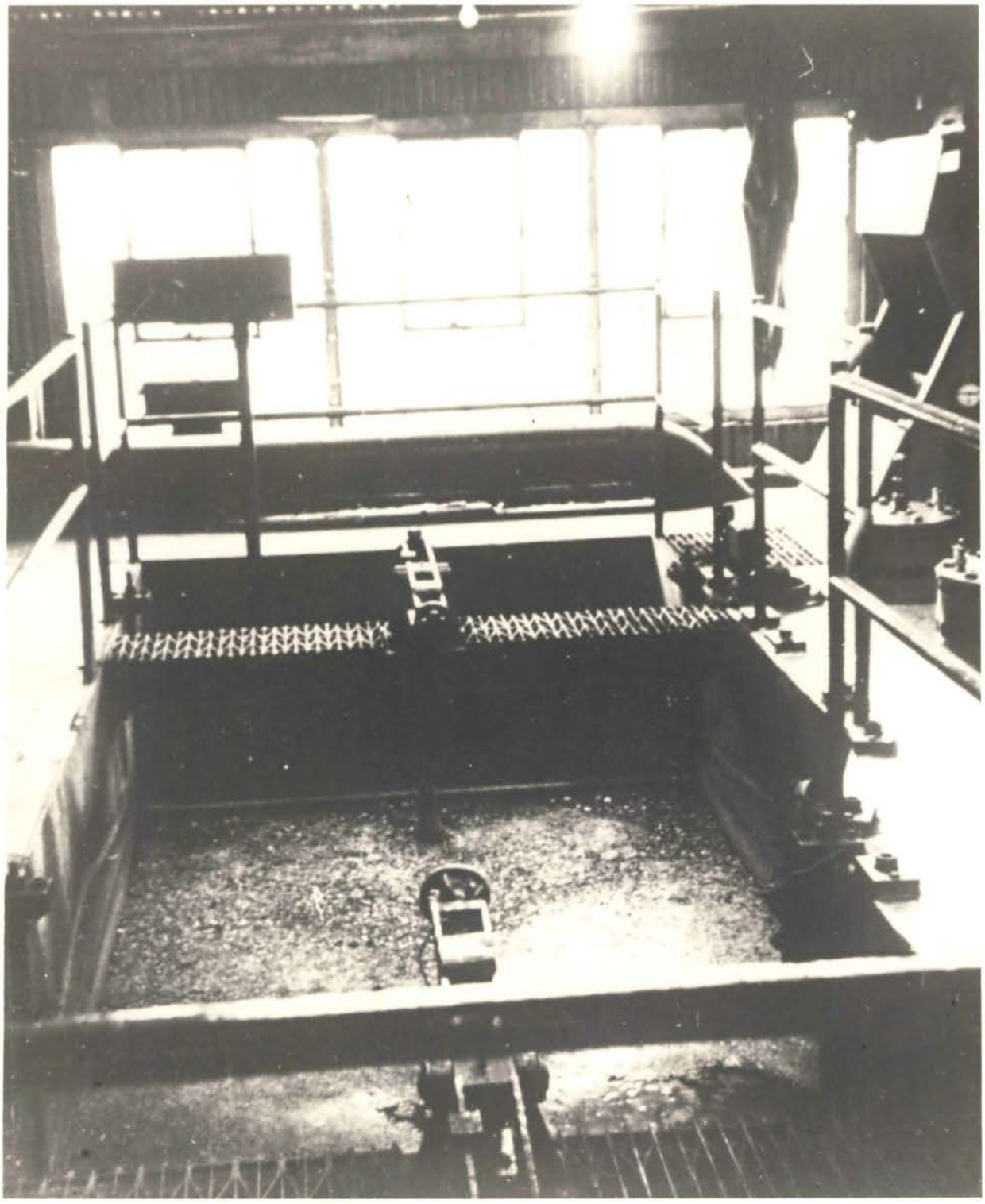
[15] Roy T. Cochram, (Interview), op. cit.



INTERIOR OF WASHING PLANT
FIGURE 6

domestic and industrial concerns.

The tipple, located on a slight grade, facilitates the loading of railroad cars. Railroad cars are switched onto a spur at the upper portion of the switch. Cars that are to be loaded are pushed by truck beneath the tipple chute where the brakes are set and coal is allowed to flow into them. Five tracks are below the tipple which make possible the loading of five different grades of coal at a time. When loaded the cars are released and allowed to roll away from the tipple to a collecting point some one hundred yards away. At the collecting point the cars are checked for the size of the coal to charge the purchaser accordingly. Empty cars are delivered and full cars are picked up daily.

The entire operation of the tipple requires the services of about eight men. The jobs performed by the men are as follow: Tipple foreman, oversees the operation of all work in the tipple. The tipple operator who is skilled in the operation of the tipple, and operates it, the hopper tender who checks the coal and dumps it from the trucks as it is delivered to the tipple; two men who take the slate from the coal on the conveyors, and two men to work on the ground in the switching of the cars for loading.

The power for the operation of the tipple is electricity, obtained from the Claremore outlet of the Grand River Power Authority from the Pensecola Dam.[16]

The operation of the state's only washing plant at Oologah constrasts with the regular tipple used at sequoyah. The coal is washed and screened before being loaded for shipment, this added operation necessitates a higher price. Coal from the hopper is crushed to the desired size and is brought into the

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16 Frank J. Podpechan, (Interview), op. cit.

washing room where the coal is cleaned by wet and pneumatic methods. The coal enters the washing vat and is carried to two alternating tables on which the water is allowed to flow and then is drained. The water used in the operation of the cleaning comes from nearby strip pits.[17] The output of the coal cleaned was 90,000 tons or about 3.4 per cent of the total mined in the State in 1946. The ratio of the refuse to the raw coal is ten per cent. The total produced for the Sooner Coal Company for 1946 was 264,760 tons of which only 100,000 tons were cleaned. The rest of the coal was processed by screening and sold as graded coal. Of 100,000 tons processed 90,000 tons were products for sale.[18]

Sales operations: Are set up in Tulsa and Claremore. The company also sells coal at the tipple to the domestic and local truckers who resell it. The railroads are the largest consumer of the coal but industry also increases markets. Coal has been hauled from this mine to Iowa for use in the industrial machinery because of the special qualities that are found in it. The coal that is mined is very free from foreign material and has a low ash content, a content which averages from 4.0 to 5.0 per cent. The sulphur content is about .9 per cent and the carbon content is near 70 per cent.[19] On a typical day at the mines in August of 1948, the writer witnessed loading of 16 railroad cars, and custom loading for domestic use by local haulers to be sold in Miami and Pryor. The coal that was loaded for domestic use was waxed. The sale to the

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17 A. B. Shoemaker, (Interview), op. cit.

18 W. H. Young, R. L. Anderson and E. M. Hall, Minerals Yearbook, 1947, Bureau of Mines, U. S. D. I., Washington D. C., (March 1949), U. S. Government Printing Office, p. 304.

19 Malcom C. Oakes, op. cit., p. 31.

ABANDONED STRIP MINE
FIGURE 7

truckers was $3.50 per ton and the sales of the truckers at the market was $10.00 per ton. The following day the railroad did not supply cars to be loaded and the men were idle except for the advance stripping operations.

The Rogers County Coal Company is typical of the many strip pits in Oklahoma. In 1947, the company employed a total of 80 men who worked only 41 days (Appendix A). This figure may be taken as the number of days in the mine was in full operation. Stripping by shovel is carried on daily whereas the actual mining takes place only on days when there is a demand for it. The laborers are forced to find other sources of income. Many work on farms, others were employed in building roads or draining the pits of the mines. When full operations are maintained, the company is capable of a daily output of 400 tons, if weather conditions permit and the demand for coal is sufficient.[20]

Mining operations can be carried on at the present rate of mining in the area for 25 years according to extimates by the operators of the mines.[21]

Other Factors in Rogers County Coal Mining

The land that is being used for stripping operations to obtain coal in Rogers county was used prior to this time for grazing. The coal occurs under knolls and the uplands are very poor for farming so the farmers do not lose valuable farm lands to the miners. The land was surveyed by the Soil Conservation Service as being class VII land or that which should be placed in forest and grasses and not used for cultivation.[22]

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20 Malcom C. Oakes, op. cit., p. 23.

21 Frank J. Podpechan, (Interview), op. cit.

22 Myron L. Heard, Soil Conservation Service District Supervisor, Rogers County, Personal Interview, (April 16, 1949).

The value of the coal per ton in Rogers County in 1946 was $2.96.[23] The value of the land prior to the mining on the County Assessor's books of Rogers County was $7.00 per acre when they were evaluated in 1932.[24] The assessed valuation the land has not changed either as the coal was being mined or after the coal had been mined. Explanation of this is given in the following example. A farm of 90 acres may be valued on the whole as $7.00 per acre. A coal company wishes to lease the land and mine the coal. While the coal is being mined a royality of ten to fifteen cents per ton is paid the owner of the land. Only 30 acres of the land is mined leaving 60 acres of good soil on the level portions of the farm.

The farmer may leave the stripped area as it is or he may plant cover trees on it. In one case apple trees were planted and apples are now harvested. The stripped areas may act as water reservoirs to hold water to be used for stock watering until the dry season then released to stock tanks for watering the stock.

The L. S. Robinson farm located near Catoosa is the best example of the utilization of the stripped areas. The land is used for grazing purposes. Mr. Robinson has fixed gates and drainage ditches from one strip pit to another. The gates are used to retain the water until a desired amount is received then the excess water is allowed to flow from one pit to the other until it reaches the Verdigris River where it is carried out of the area. Sown grasses hold the soil formed on the strip pit mounds.

The weathering of the stripped area is quite rapid since the main part of

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23 W. H. Young, R. L. Anderson and E. M. Hall, op. cit., p. 319.

24 J. H. Burrow, (Interview), op. cit.

the soil stripped away is shale. It is estimated by the Soil Conservation Service that the rocks will weather in about 15 years.

The Soil Conservation Service has not had one agreement in the Rogers County District to rework the soil and prepare it for better farming in the abandoned mining areas.[25]

Evidence of the mining operations are to be found in all parts of Rogers County. The ground had been moved and erosion is taking place but the farmers are not objecting. Perhaps the future will prove that the coal that has been mined was a mistake and require the companies to cover the stripped areas they are mining. Today the areas are a great soar on the surface of the earth in areas of Rogers County.

The industry in Rogers County is now at its greatest peak. As soon as the best coal is mined, the area will be left and many of the workers will be jobless or will be forced to move with the companies to new locations. For the industry to remain in Rogers County it is necessary that new methods be devised to mine the coal at greater depths, where reserves are known to exist.

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[25] Myron L. Heard, (Interview), op. cit.

CHAPTER V

LABOR AND LABOR PROBLEMS

Racial Composition Of The Early Miners

The railroads first induced skilled American coal miners to come the Southwest. Many miners were foot-loose during the widespread unemployment of 1873, and the railroads offered free transportation to the Oklahoma mines and an opportunity for steady work. Immigrants from the British Isles--English, Scotch, Welsh, and the Irish--attracted by higher wages than were being paid in Pennsylvania, came to Oklahoma in 1873 and 1874.[1]

After the influx of Americans and British, the railroads brought other nationalities to the Oklahoma mines. Immigrants who were not inclined to demand higher wages and shorter hours-Italians, Lithuanians, Slovaks, Poles, and Magyar Russians-came in ever greater numbers during the prosperous years of the 1880's. In 1889, estimates gave the average number of laborers employed at 1,873. The foreign born outnumbered the native born two to one.[2]

Unionism And Strikes

The first labor union to appear in Oklahoma was the Knights of Labor in 1883. The Union was not effective as a bargainer against the operators, instead the Knights of Labor in Oklahoma were opposed to the presence of the southern and eastern Europeans in the mines. The reason of this prejudice resulted from competition as they entered as an unskilled, low wage group.[3]

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1 Frederick L. Ryan, The Rehabilitation of Oklahoma Coal Mining Communities, University of Oklahoma Press, Norman, (1935), p. 27.

2 Angie Debo, The Rise and Fall of the Choctaw Republic, University of Oklahoma Press, Norman, (1934), pp. 129,130.

3 Fredrick L. Ryan, op. cit., p. 28.

The first strike occured in the Spring of 1894, when the operators declared a 25 per cent wage reduction. An attempt to work the mines with "scabs" met with violence on the part of the strikers. The strike, short lived, ended with an agreement by the operators and the workers. Coal was mined again with its usual yearly increase in tonnage.[4]

The second strike began in 1898 and lasted until 1903. The companies would pay for lump coal only, which required tined forks for loading and small screens for sifting the coal. The miners objected to this method of limiting their output, and requested from time to time that they be allowed to load all of the coal that they had actually mined, the slack (fine coal) as well as the lumps. After the miners had won this point in the 1898-1903 strike, wages were paid on the basis of mine-run coal as the coal companies had discovered they could sell both lump and slack.

The strike of 1898-1903 was effective through the organization of District No. 21, United Mine Workers of America Union of 1898. The agreement of 1903 became the most important document in industrial relations between the miners and operators in the Southwest. The agreement was made on the settlement of nine issues: (1) recognition of the Union, (2) the eight-hour working day, (3) a pit committee in each mine to settle disputes with representatives of the employer, (4) payment of wages twice a month, (5) dues, assessments, fines and initiation fees of members were tobe subtracted from wages by the employers and paid to the representatives of the United Mine Workers of America, (6) payment of work at an agreed rate that does not result immediately in production of coal, (7) each miner was given an opportunity to work, (8) companies could not subtract amounts from miners' wages without their consent to pay the salary

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[4] Angie Debo, op. cit., p. 130.

of a company physician, (9) payment of wages on ordinary daily wage scale of $2.56 or the tonnage rate for all mines at 72 cents.[5]

The next strike came in 1910, the cause of which was given as irregular employment and the loss of markets for the larger operators due to the use of petroleum and natural gas. During the suspension of work, many of the miners went to the other states where mines were in operation. When the mines reopened in Oklahoma a shortage of labor resulted which prevented mines from operating at full capacity. Also the car supply was directed to other districts, so that time was required to restore normal conditons. It was at this time that coal from other states made heavy inroads in the Oklahoma market. The state reached normalcy from the 1910 strike about 1912, and the production since then shows a steady increase until 1919, when the next strike occured.[6]

A strike of short duration was carried on in 1919 when the operators cut the wages of the miners from $6.00 per day to $5.00. The strike was short, however, as the state reached its peak production in 1920. Oklahoma is the only state shown having a greater production in 1920 than in 1918.[7]

The strike of 1924-27 marked the end of the old-time conditions from which a living had been secured by a majority of the people in the coal fields. For more than twenty years two-thirds of the miners had received employment in the large mines. The other third picked up a living from the wagon mines, the cooperative mines, and casual employments. The operators cut wages to $5.00 per

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5 Fredrick L. Ryan, op. cit., pp. 45-48.

6 C. L. Cooper (ed), Coal in Oklahoma, Oklahoma Geological Survey Bulletin No.4, Norman, (1926), p. 29.

7 Ibid., p. 29.

day and the Union struck but due to farm youths taking advantage of labor the Union lost its case. Over the ensuing three year period, the United Mine Workers' influence was swept away and was replaced by the open shop. The strike was a complete failure and the Union has virtually collapsed.

The rate of pay for labor was further reduced in 1931 to $3.60 and at the peak of the depression wagesreached the low of $2.00 per day. Since this time wages have gradually increased and reached $4.00 per day in 1934.[8]

Present Labor Conditions

The labor conditions of the workers in the coal fields of Oklahoma at present may be divided into type of labor, employment by race and sex, average days worked per year, and wages received.

Out of a total of 1,520 persons employed in coal mining in Oklahoma, eight are classified as professional and semi-professional workers, such as those employed as geologists and engineers who formulate the operation of the mines. Eight-five are propietors, managers and officials who in many cases work in the mines along with the operatives they hire, a situation especially true of the small strip and drift mines operated by small labor forces. The 26 clerical, sales and kindred workers may or may not work near the mine. Many larger operating companies have offices in the larger cities to better enable sales contacts for their products. One hundred thirteen craftsmen and foremen work in direct supervision of mining in the pits, this includes specialists in the operation of certain equipment.

The operatives with a total of 1,265 make up the largest single element of labor in the coal industry. This group of men may or may not be specialists and are subject to many forms of common labor, especially in the strip mines.

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8 Fredrick L. Ryan, op. cit., pp. 64-66.

The state of Oklahoma has passed an ordanance providing for the safety of men employed in the larger mines. This group of eight workers is known as the protective Service Workers. They are constantly looking after the safety of the workmen. Farm laborers usually employed to obtain the use of their animals in the mining operation, total only two employed for this purpose.[9]

The employment by race and sex in Oklahoma coal fields is as follows: 1,508 male and 12 female employees. Of the 1,508 employees working 1,463 were white male, 35 male negroes, and 10 other races.[10]

The age of the greater number of people who work in the coal mines of Oklahoma averages between 25 and 55 years. A distribution by age in years shows one employed in the age group 14-15, 6 age 16-17, 27, age 18-19, 157, age 20-24, 410, age 25-34, 310, age 45-54, 121, age 55-59, 75 age 60-64, 36, age 65-74 and 3, over 75 years.[11]

Oklahoma coal mining has employed an average of 2,250 laborers annually since 1939, and serves as a source of employment for many unskilled laborers. Farmers work in the small mines during the seasons they are not busy in the fields planting or harvesting. Many of the people working in mines are actuallyowners of the land mined and receive both wages as well as a royality, from the leasing company, on the coal.[12]

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9 Sixtieth Census of the United States, 1940. Population, Vol. III, The Labor Force, Part 4, Bureau of the Census, U. S. Printing Office, Washington, (1943), p. 923.

10 Ibid., p. 941.

11 Ibid., p. 915.

12 Fortieth Annual Report of Mines and Mining of Oklahoma, Department of Chief Mine Inspector, (June 1948) p. 19.

From the average number of days worked by the miners one receives a false impression. For example, in 1943 Oklahoma showed 488 average days worked. This figure is the result of more than one shift operating eight hours a day.[13]

Labor is not assured of steady work in the mines due to weather conditions, coal demands, and availability of railroad cars to be loaded. Coal mining in January 1949 employed 2,400, a decrease of 100 under December 1948 or a decrease of 7.7 per cent.

Coal mining payrolls for the first three quarters of 1948 are as follows: January, February, March, $1,786,738, April, May, June, $1,627,539 and July, August, and September $1,771,638. These figures are limited from the standpoint of representing total wages for the quarrying industry because companies employing fewer than eight workers are not required to file contribution reports under the Employment Security Act.[14]

Oklahoma coal mining has declined since World War II and has forced many of the marginal producers to close their mines due to competition from the more stable operators. It is expected that the number of employees for 1949 will show a further decrease over the preceding year.

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13 Ibid., p. 19.

14 Personal Correspondence with Oklahoma Employment Security Commission, (April 5, 1948).

CHAPTER VI

FUTURE OF THE INDUSTRY IN OKLAHOMA

Trends Of Coal Mining In Oklahoma

Since the coal fields were first opened in 1872, the mines have undergone a complete reversal in the methods of mining. The early miners were experienced in underground mining by the pick and shovel method. Introduction of mining machinery changed this method about the turn of the twentieth Century and production increased steadily. The early coal miners were miners by profession, today the laborers in the mines may or may not be experienced.

Introduction of electric machinery for the underground mines and mechanization of the mines brought about the first Union of strength. The Union was effective as a means of bargaining with the operators of the coal mines until 1924. As the large operators were forced out of business in the late twenties the Unionslost their power and the State at the present is not under Union labor. The first salaries for coal mining were low and laborers were paid by the tonnage produced. Average pay for labor between 1872-1916 was approximately $2.75 per day. During the years of World War I, the price paid per day increased to about $6.00 per day average. Following the close of the War, prices fell sharply and the end of the operation in the Union controlled mines dropped toan average of $2.00 to $3.00 per day in 1929-1934.[1] Prices gradually rose, and under the labor act in 1937 wages were paid by the hour. The present wage received by the miners averages from $1.58 per hour for the unskilled to $2.32 per hour for the skilled laborers.[2]

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1 Fredrick L. Ryan, The Rehabilitation of Oklahoma Coal Mining Communities, Norman, University of Oklahoma Press, (1935), p. 69.

2 Frank J. Podpechan, Owner on the Rogers County Coal Company, Sequoyah, Oklahoma, Personal Interview, (August 15, 1948).

Coal mined in Oklahoma in the early days came from the outcrops and the shaft mines. Mining of strip mines was not considered profitable due to the high cost of removing the overburden. In 1929, the large and medium operators were forced to close their mines for economical reasons and strip mining began to increase in production. Since the shift to pit mining, the industry has received its greatest tonnage by this method.

Mining Improvements

Improvements in the methods of mining in Oklahoma have made possible the development of the strip mining. The first machinery used in the stripping operation were steam shovels and the use of teams of horses pulling fresno's to clean the mines. Today, the stripping is done by large electric shovel, loaded by electric loaders and seperated into grades at the tipple by electricity. One mine worker said "We mine and sell coal but the only coal that is used by the coal company is that which is used to heat the office". Improvements of transportation from the source of mining to the tipple has increased the load carried and the speed at which it is carried. Today, trucks can carry thirty tons of coal in one trip in comparison to the load a wagon could carry in the early days.

Introduction into the underground mines of Oklahoma of the new Colmol, a multiple auger type boring machine on caterpillars would enable the operations of the underground mines to produce coal with fewer laborers and with a greater output.[3] This is important since labor is the highest cost item in production in the underground mines. Another machine for mining coal is now in production,

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[3] J. W. Woomer, "Coal Industry," Journal of Petroleum Technology, Vol. I, No. 3, American Institute of Mining and Metallurgical Engineers, New York, (March, 1949), p. 113.

the Joy Continuous Miner. The machine has been perfected to cut and load following the undulations of a coal seam because of lateral and vertical movements in form of a universal joint independent of the traction caterpillar.[4]

State Laws Effecting The Production Of Coal

The first laws enacted to protect the coal miners of Oklahoma were made by the United States Inspector of Mines for Indian Territory. His duty was to provide safe conditions for the laborers. Prior to 1885 the coal miners discharged their own shots to dislodge the coal. The first law provided for shot-firers hired in the more gaseous mines to discharge the powder. Following Statehood, laws forced the operators of coal mines to comply with a safety measures such as rock dusting, permissible explosives, and the efficient handling of gas. Many operators failed to adopt the safety precautions and resisted attempts to enforce the mining laws, a factor which led to the collapse of underground mining in Oklahoma.

Present legislation is being carried on by the State of Oklahoma to protect the mines and to make them safe. In 1947, an act providing for the promotion of safety in coal mines by eliminating the hazard of rock dust, creating offenses and providing penalitites, and by declaring an emergency was enacted. This law made it the duty of all persons, owners, and operators, to employ and use water on the cutting bars of all mining machines while cutting rock and on all jack-hammer drills while drilling in rock. Any person convicted of the unlawful operation of such machines was subjected to a fine of not less than $50.00 and not more than $500.00.[5]

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[4] Ibid, p. 113.

[5] Thirty-Ninth Annual Report of Mines and Mining in Oklahoma, (June 1947), Department of Chief Mine Inspector, p. 5.

Other laws have been put before the House of Representatives of Oklahoma to force the operators of mines to cover and level the land when the stripping operations of coal are completed. This law was introduced into the House of Representatives by a member from one of the non-coal producing counties and failed to pass. Operators claim the cost of covering the pits following the removal of coal would raise the price too high to prevent further production.[6]

Future Markets For Oklahoma Coal

Markets for the coal of Oklahoma are being sought by operators and the State Planning and Resources Board. The Bureau of Mines has helped by checking analysis of the Oklahoma coal to find markets for the type of coal produced in the various pits. Mixture ofcoal from various pits had also been tested to find desirable qualities needed for industrial uses.[7]

The greatest barrier to the producers of coal in Oklahoma is that of the railway charges. Oklahoma cannot sell at prices as low as other states, and has suffered from the loss of markets in Kansas City, St. Louis and many other industrial cities. One of the arguments for the development of the Arkansas Valley is to provide lower rates for coal shipment to compete with mines from other parts of the United States. The Arkansas Valley Development would enable Oklahoma coal to reach the markets much more cheaply than at the present railroad rates. Coal shipped by rail routes to St. Louis and other points in Missouri, is $2.75 per ton in less than train lots. The Arkansas River route could ship the coal at $2.15 per ton. A saving of one barge load of 1,000 tons of coal

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6 David L. Smith, State Representative, Rogers County, Personal Interview, (March 24, 1949).

7 Malcom G. Oakes, Member of Oklahoma Geological Survey, Personal Interview, (February 28, 1949).

from Ft. Smith, Arkansas to St. Louis would be $600. If the plan for the development of the Arkansas River is passed future markets are available for the coal produced.[8]

The development of the iron and steel industry in Texas has furnished another market for the coal produced in Oklahoma. The Lone Star Coal Company of McCurtain, Haskell county now produces for this purpose. The coal is shipped to Texas where it is converted into coke for use in the iron and steel industry.[9]

The Outlook

The conversion of industries to use fuel other than coal has greatly affected the coal production of Oklahoma in past years, and the future does not appear promising for a greater demand for coal in industry. Production by the larger producing companies has been suspended and the future of the size of companies is limited by the amount of coal that is available that can be mined profitable.

The greatest production will be carried on in the strip mines due to the lower cost of mining. Production of coal is Oklahoma for the past 10 years has averaged nearly 3,000,000 tons annually.[10] If the production is maintained and the markets are retained, the industry will continue to prosper. The position of Oklahoma as the sixteenth producer of coal in the United States places it in

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8 Neglected Riches in the Arkansas Basin, Plans and Resources Board of Oklahoma and Arkansas Resources and Development Commission, (1947), p. 96.

9 John M. Malley, Chief Mine Inspector, Oklahoma City, Personal Interview, (February 28, 1949).

10 Fortieth Annual Report of Mines and Mining of Oklahoma, June 30, 1948, Department of Chief Mine Inspector, (June 1948), p. 19.

a respectable position.[11]

Oklahoma's position as a major producer in respect to neighboring states falls below that of Missouri, Kansas, and Colorado and above the states of Arkansas, Texas, and New Mexico. The state of Texas and New Mexico are potential markets for Oklahoma Coal.[12]

Oklahoma coal production will probably never exceed 5,000,000 tons annually until industrial markets are secured. The use of natural gas and petroleum in industrial machinery still remains as the chief competitor to Oklahoma coal.

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11 W. H. Young, R. L. Anderson, and E. M. Hall, Minerals Year Book, 1947, Bureau of Mines, U. S. D. I., Washington D. C., (March 1949), p. 309.

12 Ibid., p. 309.

A P P E N D I X

APPENDIX A

Production Report For Fiscal Year Ending June 30, 1948*

Name of Company	Address	No. Men Emp.	No. Days Worked	Total Tons
		COAL COUNTY		
Cooley Brothers	Lehigh	35	252	87,766 (S)
Dunn Fuel & Lbr. Co.	Coalgate	34	313	74,574 (S)
W.E. Logan & Son (2)	Tupelo	30	156	76,199 (S)
Peters Coal Co.	Coalgate	5	217	1,914 (P)
Phillips Coal Co.	Hazelton	5	158	773 (P)
S. H. & S. Coal Co.	Coalgate	11	157	3,038 (P)
21 Coal Co.	Coalgate	10	194	2,597 (P)
TOTAL		130	1,447	246,861
		CRAIG COUNTY		
C & M Coal Co.	Estella	3	108	1,563 (S)
H & H Coal Co.	Estella	8	101	2,581 (S)
Parker Mine	Estella	2	98	401 (M)
Welch Coal Co.	Welch	12	200	13,007 (S)
TOTAL		25	507	17,552
		HASKELL COUNTY		
Bisby Coal Co.	Stigler	2	171	633 (P)
Black Boy Coal Co.	Stigler	2	40	70 (P)
Black Crystal Coal Co.	Stigler	4	50	562 (S)
Henry T. Brandenburg	Keota	4	215	5,133 (S)
Dock Coal Co.	Stigler	7	266	2,257 (P)
Geo. L. Fletcher	Stigler	3	120	228 (P)
Garland Coal & Mng. Co.	Stigler	21	264	70,626 (S)
Lone Star Coal Co.	McCurtain	47	26	934 (M)
Panther Coal Co.	McCurtain	14	166	6,307 (P)
H. E. Raiburn	Stigler	3	53	318 (P)
Rogers Coal Co.	Stigler	5	213	1,247 (P)
J. C. Sory	Stigler	2	80	890 (S)
Thompson & Havens	Stigler	3	65	1,122 (S)
J. H. Wilson	McCurtain	24	222	34,253 (S)
TOTALS		141	1,851	124,580
		LATIMER COUNTY		
Bishop Coal Co. (2)	Wilburton	9	111	1,299 (P)
Edmund & Vinson	Wilburton	4	180	1,919 (P)
Mike Gratis	Wilburton	1	116	228 (P)
K. C. Coal Co.	Gowen	6	122	2,034 (P)
Midway Coal Co.	Wilburton	4	24	1,540 (P)

(continued on next page)

APPENDIX A (cont'd)

Production Report For Fiscal Year Ending June 30, 1948*

Name of Company	Address	No. Men Emp.	No. Days Worked	Total Tons
LATIMER COUNTY (cont'd)				
Floyd Newman	Hartshorne	1	179	433 (P)
Old Mac Coal Co.	Red Oak	54	243	291,144 (S)
W. H. Pahlon	Wilburton	3	115	288 (P)
Rex Coal Co.	McAlester	30	189	11,484 (P)
Alvin Williams	Wilburton	2	129	960 (P)
TOTAL		114	1,408	311,329
LEFLORE COUNTY				
A & B Coal Co.	Bokoshe	7	193	8,407 (P)
Best Fuel	Bokoshe	41	140	14,821 (M)
Big 4 Coal Co.	Bokoshe	12	123	4,688 (P)
Black Diamond Coal Co.	Bokoshe	9	195	7,739 (P)
Buck Creek Coal Co. (5)	Panama	98	192	42,667 (M)
Caldwell Coal Co.	Poteau	7	59	1,134 (P)
Davies & Swindle	Bokoshe	17	173	7,436 (M)
Eastern Coal Co.	Bokoshe	8	85	2,268 (M)
Evans Coal Co.	Bokoshe	55	22	19,622 (S)
Gee Mac Coal Co.	Bokoshe	5	18	360 (P)
Gibson Coal Co.	Howe	2	65	467 (P)
Gray Horse Coal Co.	Poteau	5	45	493 (M)
Jackson & Squire	Coaldale	23	119	135,943 (S)
Keener Coal Co.	Bokoshe	17	173	12,407 (M)
Myers Coal Co.	McCurtain	9	155	2,432 (P)
F. S. Neely Co.	Bokoshe	18	130	47,800 (S)
New Cameron Coal Co.	Panama	40	119	64,353 (S)
New Matchless Coal Co.	Poteau	25	196	11,671 (M)
R. & P. Coal Co.	Bokoshe	5	226	3,949 (M)
Poteau Coal Co.	Poteau	19	158	8,073 (M)
Paul Rees Coal Co. (2)	Bokoshe	36	155	18,931 (P)
Reliance Smokeless Coal	Bokoshe	18	230	16,181 (M)
Rex Coal Co.	Milton	5	119	1,757 (P)
J. F. Turnipseed Coal Co.	Poteau	15	180	2,984 (M)
White Eagle Coal Co.	Bokoshe	15	43	1,706 (M)
Tony Zagar	Poteau	10	115	9,486 (S)
Kleaner Coal Co.	Bokoshe	38	196	16,264 (M)
TOTALS		559	3,624	464,039
MUSKOGEE COUNTY				
Barnes Coal Co.	Briartown	4	52	263 (P)
Hicks Coal Co.	Porum	3	103	298 (P)
Hollis Coal Co.	Wainright	3	64	581 (S)

(continued on next page)

APPENDIX A (cont'd)

Production Report For Fiscal Year Ending June 30, 1948*

Name of Company	Address	No. Men Emp.	No. Days Worked	Total Tons
		MUSKOGEE COUNTY (cont'd)		
Leavall Coal Co.	Porum	68	365	193,356 (S)
Warner Coal Co.	Warner	6	138	2,884 (S)
TOTALS		84	722	197,382
		OKMULGEE COUNTY		
Atlas Coal Corporation	Henryetta	116	214	113,549 (M)
Ben Hur Coal Co.	Henryetta	150	207	134,098 (M)
Broken Arc Coal Co.	Okmulgee	82	249	431,813 (S)
Coal Creek Coal Co.	Dewar	18	181	10,374 (M)
Coalton Coal Co.	Coalton	14	28	1,363 (M)
Davis Coal Co.	Henryetta	2	98	393 (P)
McGinnis & Grafe, Inc.	Henryetta	54	302	148,645 (S)
Martin & Geary Coal Co.	Dewar	3	120	654 (M)
Starr Coals, Inc. No.2	Henryetta	213	228	196,301 (M)
Starr Coals, Inc. No.3	Henryetta	109	195	89,312 (M)
Starr Coals, Inc. No.6	Henryetta	66	193	56,318 (M)
TOTALS		827	2,015	1,182,820
		PITTSBURG COUNTY		
A & P Coal Co.	Hartshorne	12	188	6,687 (M)
Buck Coal Co.	Krebs	2	126	435 (P)
Cardinal Coal Co.	Adamson	5	186	1,366 (P)
Collins Coal Co.	Krebs	6	110	1,132 (M)
Max Hernandez	Hartshorne	2	165	446 (P)
Hodgens Mine	Pittsburg	6	271	3,096 (P)
Julian Coal Co.	McAlester	42	189	16,575 (M)
McAlester-Alderson Coal	Haileyville	15	252	9,412 (M)
C. L. Martindale	Adamson	3	90	540 (P)
Midway Coal Co.	Dow	2	84	570 (P)
M P & K Coal Co.	Hartshorne	5	182	873 (P)
Pittsburg-Blanco Coal	Pittsburg	6	184	1,625 (P)
Rex Coal Co.	Pittsburg	8	228	3,999 (P)
Starr Coals Inc.	McAlester	257	241	259,340 (M)
John Warren	Adamson	2	91	361 (P)
TOTALS		373	2587	306,457
		ROGERS COUNTY		
Hogue Brown Coal Co.	Chelsea	5	58	1,000 (S)
McNabb Coal Co. (2)	Catoosa	72	319	155,272 (S)

(continued on next page)

APPENDIX A (cont'd)

Production Report For Fiscal Year Ending June 30, 1948*

Name of Company	Address	No. Men Emp.	No. Days Worked	Total Tons
		ROGERS COUNTY (cont'd)		
Osborne Coal Co.	Chelsea	4	80	1,564 (S)
Rogers County Coal Co.	Claremore	80	41	28,739 (S)
Sooner Coal Co.	Oologah	53	230	294,088 (S)
TOTALS		214	728	480,663
		TULSA COUNTY		
Acme Coal Co., Inc.	Tulsa	11	210	6,121 (M)
Consumers Coal Co.	Yale	15	189	6,246 (M)
Western Coal Co., Inc.	Jenks	18	152	63,542 (S)
TOTALS		44	551	75,909
		WAGONER COUNTY		
Mayflour Mining Co.	Porter	6	118	11,750 (S)
Wagoner County Coal Co.	Porter	7	46	810 (S)
TOTALS		13	164	12,560

TYPE OF MINING: (M) MACHINE MINING (P) PICK MINING (S) STRIP MINING

SUMMARY AND CLASSIFICATION ALL COAL MINES
FOR THE F ISCAL YEAR ENDING JUNE 30, 1948

Number of Counties	11
Number of Mines Operating	111
Number Tons Lump	710,046
Number Tons Nut	305,668
Number Tons Pea-Slack	771,922
Number Tons Mine Run	1,632,516
Total Tons Produced	3,420,152
Tons Produced-Underground	1,149,484
Tons Produced-Strip	2,270,668
Number Mining Machines used	107
Number Animals used	26

*Fortieth Annual Report of Mines and Mining of Oklahoma, Department of Chief Mine Inspector, (June 1948), pp. 12-18.

APPENDIX B

COAL SUMMARY FOR OKLAHOMA - 1945

Disposition of Coal produced (net tons)

Loaded for shipment by rail or water	2,486,625
Shipped by truck or wagon (excluding coal used by mine employees)	146,690
Used at Mines for power and heat and made into beehive coke at mines	10,741
Total quantity	2,647,380
Average Value per Ton	$3.75
Average Number of Employees:	
Underground	1,049
In Strip Pits	428
All Others	463
Total	1,940
Average Number of days mines were active	209
Number of Man-days worked	405,268
Average tons per man per day	6.53

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