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**A CHEMICAL STUDY OF OKLAHOMA
COALS**

By

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**Co-operative with
The School of Chemical Engineering of the
University of Oklahoma
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and
The Department of Mines of
the State of Oklahoma
Miller D. Hay, Chief Mine Inspector**

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INTRODUCTION

ACKNOWLEDGMENTS

The writers wish to express their appreciation and thanks to: Dr. W. B. Bizzell, President, University of Oklahoma; Miller D. Hay, Chief Mine Inspector; Dr. Chas. N. Gould, Director, Oklahoma Geological Survey; and Dr. Guy Y. Williams, Director, School of Chemical Engineering, for making this work possible and for the assistance which they have given during its progress. The geology was supplied by C. L. Cooper, chief geologist of the Oklahoma Geological Survey.

We wish to thank personally and especially: W. R. Rutherford, W. C. Robbins, and R. H. Brown, Assistant Mine Inspectors, for furnishing transportation and able assistance in the field while collecting samples; Jim Ballard, Department of Mines, McAlester, for his valuable assistance in furnishing information from the records in his office.

We are indebted to the various coal companies and their operating assistants for their liberal assistance in securing representative samples.

The analytical work was done in the laboratory of the Department of Chemistry, University of Oklahoma.

PURPOSE OF WORK

Proximate analysis data on certain Oklahoma coals is available to the investigator and the technician in reference bulletins published by the United States Bureau of Mines¹, U. S. Geological Survey², and Oklahoma Geological Survey³. Although the information given in these publications is of great value to engineers, technicians, and some operators, there has been no special attempt made to interpret the data in such a manner that the producer, purchasing agent, and consumer could utilize it to the best advantage.

1. Bulletin 22, 85, 123, and 193; Technical Paper 411.
 2. Bulletin No. 4, (7)
 3. Bulletin No. 4.

Too many consumers and dealers hesitate to take advantage of the information contained in the above bulletins because so many figures appear complicated to them. Many of those who do attempt to use the information pay little regard to the type of sample. Others know Oklahoma coal only as McAlester, Henryetta, Hartshorne, etc.

The writers' purpose is to supplement the previous work done on Oklahoma coals and to make available proximate analysis data on composite face samples taken from all mines in the State which were operating during the summer of 1928; to interpret the data obtained in such a manner that it will be of assistance to producers and consumers in making coal contracts; in checking samples submitted as to their agreement with gross shipments, in calculating approximate calorific values in the absence of a calorimeter, and in making a comparative evaluation of one coal with another.

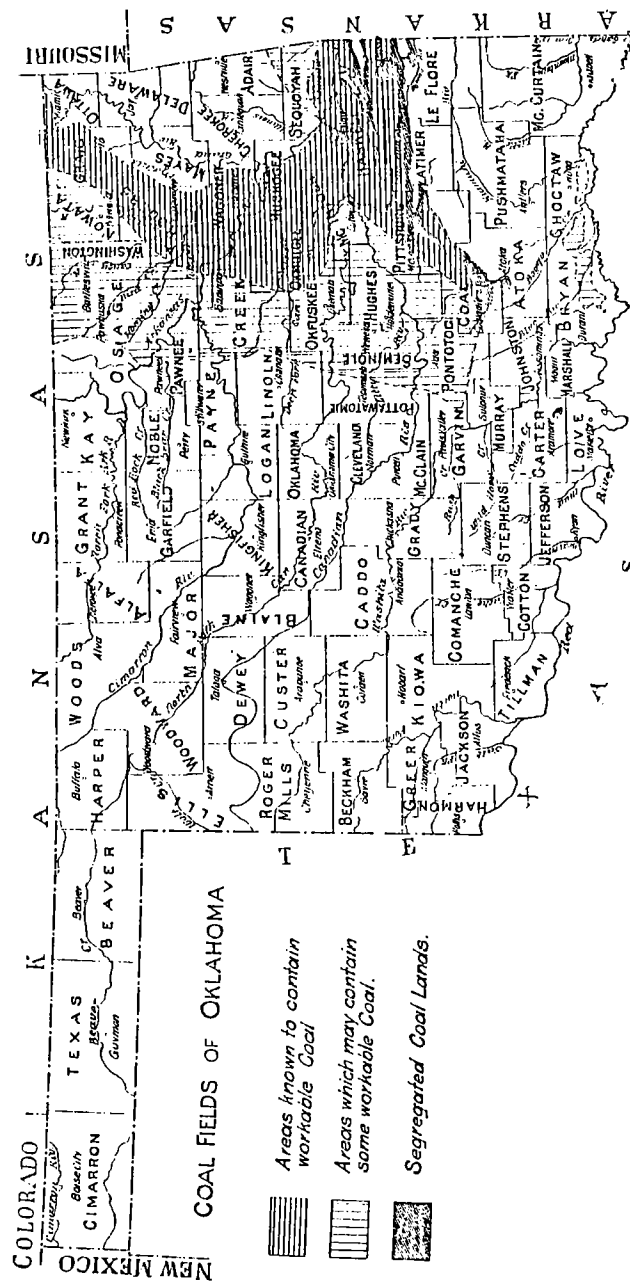
GEOGRAPHY AND GEOLOGY

GEOGRAPHY AND DESCRIPTION OF OKLAHOMA COAL SEAMS BY DISTRICTS

The coal fields of Oklahoma are found in the east-central and northeastern parts of the State, north of the Ouachita and west and southwest of the Ozark Mountains. (See fig.1). The workable coal underlies an area of approximately 12,000 square miles, located in Atoka, Coal, Craig, Haskell, Latimer, LeFlore, Muskogee, Okmulgee, Pittsburg, Rogers, Tulsa, and Wagoner counties. It has been estimated by the United States Geological Survey that this area contains about 79 billion tons of coal, enough to last 25,000 years at the present rate of mining. These fields comprise the Western Region of the Interior Province of the coal fields of the United States, in which is included the coal producing areas in the states of Iowa, Nebraska, Missouri, Kansas, Arkansas, and Oklahoma. The Oklahoma area is contiguous with the coal fields of southern Kansas and western Arkansas.

The coal industry of this State is intimately connected with the development of railroad transportation. The building of the Missouri, Kansas, and Texas; Choctaw, Oklahoma, and Gulf (now Rock Island); St. Louis and San Francisco; and the Kansas City Southern between 1872 and 1900 gave great impetus to production in the new coal field, which the next year (1901) passed the two million ton mark for the first time. Later the Fort Smith and Western; Atchison, Topeka, and Santa Fe; Midland Valley; and Kansas, Oklahoma, and Gulf built lines through the coal fields, giving the area excellent transportation facilities to outside markets.

This part of Oklahoma is located almost entirely in the Prairie Plains physiographic region which borders the Ozark Mountain



region. The extreme southwestern corner of the area, comprising Coal, Pittsburg, and parts of Latimer, McIntosh, and Okmulgee counties, is in the Sandstone Hills region. Drainage is obtained through the Arkansas and Canadian rivers and their tributaries, and a small part, (Coal County) by the tributaries of Red River (Boggy Creeks). There is about 2,000 feet of relief 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. The highest point, Cavanal Mountain west of Poteau, is over 2,300 feet.

Coalgate-Lehigh District⁴

The Atoka and Lehigh coals, found in this district, are equivalent to the Hartshorne and McAlester coals respectively. These coals both occur in the McAlester shales, the Hartshorne coal being in the base, very close to the sandstone of the same name. The McAlester or Lehigh coal is found from 1,200-1,500 feet above the Hartshorne and is from 3½ to 4½ feet in thickness. The Atoka coal is variable, averaging 2 to 3 feet in thickness.

McAlester-Hartshorne District

There are four beds of workable coal in this district—the upper and lower Hartshorne, the McAlester, and the Secor. The upper and lower Hartshorne are found 50 to 60 feet apart in the base of the McAlester shale. The upper coal averages 4 feet, while the lower varies from 2 to 4 feet. The McAlester, in its usual position above the Hartshorne, averages 4 feet or better in thickness. The Secor is thought to be the same as the Witteville and Jones Creek coals. It is from 2 to 2½ feet thick and has been extensively stripped in this area.

Wilburton-Red Oak District

There are three coals mined near Wilburton, the two Hartshorne beds and the McAlester. The first two beds reach their maximum development here, and at some places are close enough to be mined together. The upper coal averages 3½ to 4 feet and the lower 4 to 5 feet.

North of Wilburton, near Quinton, is found the Jones Creek (Witteville) coal, locally called the Quinton coal. This bed averages about 2 feet thick.

Hughes-Howe-Poteau District

There are seven beds of coal in this district—the two Hartshorne, two McAlester, the Cavanal, and the two Witteville coals. The lower Hartshorne averages 2 feet, while the upper Hartshorne and the two McAlester beds are too thin to be worked. The Cavanal

bed, which outcrops around the foot of Cavanal Mountain, is in the Savanna formation and averages 2½ to 3 feet of coal. The Witteville coals, above the Cavanal, are in the base of the Boggy formation, and about 1,400 feet above the McAlester coal. These coals, separated by about 200 feet, each average about 4 feet in thickness and have a shale or dirt band of variable thickness up to 8 inches.

McCurtain-Bokoshe-Panama District

The Panama coal lies in approximately the same stratigraphic horizon as the Hartshorne coals, but differs in thickness and structure. In some places it shows 7 feet of clean coal, but often within short distances it is divided by a shale band into two benches. In other places the coal is 4 feet thick, and in places extremely faulty.

Stigler-Tamaha District

The McAlester coal, found in this district, is 22 to 30 inches thick and in places is 18 to 30 feet below the surface, and is therefore suitable for stripping. The coal is reported to be excellent blacksmith coal.

Henryetta District

This district, one of the most intensively mined areas in the State, covers about 10 square miles. The Henryetta coal, thought to be a correlative of the Cherokee coal to the north in Oklahoma and the Wier-Pittsburg coal in Kansas, averages 34 to 36 inches in thickness. To the west of the present mine area several core-drill holes show the coal to be slightly thicker. The coal bed is a member of the Senora formation.

Northeastern Oklahoma

There are three important coals in this part of the State, the lowest, the Cherokee coal, is near the top of the Cherokee shale, the next highest, the Fort Scott coal, is at the top of the Cherokee shale in contact with the Fort Scott limestone, and the Dawson coal, found at about the horizon of the Cheekerboard limestone, is in the Coffeyville formation. The Cherokee coal is from 18 to 22 inches thick and is stripped in Craig and Rogers counties. The Dawson coal averages 15 to 20 inches and is stripped at Dawson, Collinsville, and Talala.

There are a number of thin scattered "stray" seams of coal in this part of the State that are of no importance as commercial deposits. However, these thin beds are worked locally by farmers who utilize them for their fuel supply.

GEOLOGY

The coal-bearing formations of Oklahoma are late Pottsville (?), Allegheny, and lower Conemaugh in age, all being stages of the Pennsylvanian system. These formations with equivalents are shown in the following table:

4. See fig. 2, for location of the eight coal producing districts of the State.

AGE		CENTRAL-SOUTHERN OKLAHOMA	NORTHEASTERN OKLAHOMA
PENNSYLVANIAN	PERMIAN	Pontotoc	Absent
		Ada formation Vamoosa formation	Pawhuska formation Elgin sandstone Nehalem formation Ochelata formation
	CONEMAUGH	Belle City limestone	Dewey limestone
		Francis formation	Nellie Bly formation Hogshooter limestone
			Coffeyville formation
		Absent	Lenapah limestone
	ALLEGHENY	Seminole conglomerate	Nowata shale
		Holdenville shale Wewoka formation	Allamont limestone Bandera shale Pawnee limestone
			Labette shale
		Wetumka shale	Fort Scott limestone
		Calvin limestone	Cherokee shale
		Senora formation	
		Stuart shale	
		Thurman sandstone	
		Boggy shale	
		Savanna sandstone	
		McAlester shale	
		Hartshorne sandstone	
	POTTS-VILLE	Atoka formation	Morrow formation
		Wapanucka limestone	
MISSISSIPPIAN	Caney shale	Pitkin limestone	

The coals are found mostly in the Cherokee shale in northeastern Oklahoma and in the equivalents of the lower part of this formation to the south. The highest coal, the Dawson, found in the Coffeyville formation, is produced from strip pits at Dawson, northeast of Tulsa, Collinsville, and Talala.

PRODUCTION OF COAL IN OKLAHOMA

Table 1 gives the production of coal in Oklahoma from 1910 to 1928 inclusive, according to the United States Bureau of Mines and the Department of Mines of Oklahoma.

Table 1.—Coal Production in Oklahoma⁵

YEAR	TONS	YEAR	TONS
1910.....	2,646,226	1920.....	4,830,228
1911.....	3,974,242	1921.....	3,362,623
1912.....	3,675,418	1922.....	2,802,511
1913.....	4,165,770	1923.....	2,885,038
1914.....	3,988,613	1924.....	2,329,615
1915.....	3,693,589	1925.....	2,325,810
1916.....	3,608,011	1926.....	2,339,000
1917.....	4,386,814	1927.....	3,485,992
1918.....	4,813,417	1928.....	3,500,187
1919.....	3,802,113		

METHOD OF TAKING AND PREPARING SAMPLES

Face samples were taken by the senior author with the assistance of assistant mine inspectors W. R. Rutherford, W. C. Robbins, and R. H. Brown. All mines operating during the months of June, July, and August, 1928, were visited and samples obtained therefrom. Unfortunately, it was necessary to miss some mines due to their condition at the time samples were being taken.

TAKING SAMPLES IN MINE

Composite face samples were taken from eighty mines. The time available for taking and analyzing samples was responsible for the selection of this type of sample. At this point attention should be called to the fact that mine samples generally may not represent delivered coal. Frequently the ash content of delivered coal will be higher than that of the mine sample. In high moisture coals the delivered sample may be lower in moisture and higher in heating value, due to the loss of moisture by evaporation during transit. However, composite face samples furnish good criteria for determining the character of coal that can be produced from any mine or locality. Also, mine samples give the operator a means of determining when mining methods and equipment should be improved.

In general the procedure followed in the taking of samples was that given in Technical Paper 1, Bureau of Mines, on "The Sampl-

5. Production from 1910 to 1926 inclusive taken from Technical Paper 411, Bureau of Mines.

ing of Coal in the Mine" by Joseph A. Holmes. The procedure used is as follows:

After conferring with mine superintendents and pit bosses, points for sampling were selected. The face of the bed was cleared of burned powder, loose coal, dirt, and foreign matter from roof to floor for a width of five feet. In the middle of the cleared area on the face the coal was cut away with a pick from roof to floor for a width of one foot and a depth of one inch or more in order to remove all inferior coal and square up the face. The floor was cleaned and smoothed and a sampling cloth (6 by 7 feet) spread upon it close to the face of the coal. A perpendicular cut two inches deep and six inches wide was made from roof to floor down the middle of the foot wide cut previously made in the coal face. A sample weighing at least six pounds per foot thickness of the bed was cut from the coal face.

As soon as the cutting of the sample had been completed it was inspected for partings or balls of impurities more than three-eighths inch thick or more than two inches in maximum diameter. Those found were excluded from the sample providing the mining methods employed justified their exclusion. The coal was then crushed until all passed through a three-eighths inch screen and carried in containers to the next sampling point.

Samples were taken in a like manner from other points in the mine. The samples from all points were mixed by weight in proportion to the thickness of the seam at the point sampled, i. e., 12 pounds of coal from a two foot vein would be mixed with 15 pounds from a two and one-half foot vein. The composite sample was thoroughly mixed by rolling on the sampling cloth, followed by forming it into a conical pile. The top of the pile was flattened and quartered by a clean dry sampling shovel, two quarters were brushed off, the process of mixing and quartering was then repeated until a suitable amount remained on the cloth. It was then spread in a circular mass about 2 inches deep and the sampling scoop used to fill the sample can compactly with portions from opposite quarters. The sampling can held approximately three pounds of coal and could be sealed air tight by the use of a rubber gasket. The entire sampling operation was carried out in the mine. The cans were properly labeled and mailed to the laboratory.

PREPARING SAMPLES AT THE LABORATORY⁶

The 3-pound samples were air dried at 35° C. in a special air drying oven until the successive weighings showed a loss not to exceed 0.1 per cent per hour. The samples were then crushed with

6. The procedure followed was taken from, "Methods of Analyzing Coal and Coke", by Frederic M. Stanton and A. C. Fieldner; Bureau of Mines Technical Paper 8, 1913. Details will not be given; those interested should refer to that publication.

jaw and disc crushers to 20-mesh fineness. A 50 gram portion was placed in a 4 oz. rubber stoppered bottle and placed aside for the determination of total moisture. The remainder of the sample was thoroughly mixed and riffled down to approximately 200 grams. This portion was ground to pass a 60-mesh sieve by means of a ball mill, mixed again and reduced with a riffle sampler to the quantity that would almost fill a 4 oz. wide mouth, rubber stoppered bottle.

The remainder of the 3 pound samples was ground in a ball mill and stored in air tight containers. The samples were weighed at the beginning of the analyses and after the analyses were completed in order to observe any change in weight that had taken place.

LABORATORY PROCEDURE

The methods of analysis employed have been taken, for the most part, from "Methods of Analyzing Coal and Coke", Technical Paper 8, Bureau of Mines, by Frederic M. Stanton and A. C. Fieldner. In some determinations a substitute method was used, due to available equipment. The methods used will be briefly described.

MOISTURE

A 1-gram sample of the 60-mesh coal was placed in a weighed $7/8$ by $15/8$ inch Sillimanite capsule and heated for an hour at 105° C. in a constant temperature oven. The capsule was then removed from the oven, covered with a special flat aluminum cover, and cooled in a desiccator over sulfuric acid, the loss in weight was multiplied by 100 and recorded as the percentage of moisture on the "air dry" basis.

VOLATILE MATTER

A 1-gram sample of the 60-mesh coal was weighed into a bright 10 cc. platinum or iridium crucible, with a close-fitting capsule cover. The crucible and contents were heated at a temperature of 950° C. in a specially designed electric furnace of the vertical type. The crucible was heated for exactly 7 minutes, removed from the furnace, cooled, and weighed. The loss in weight (l) minus the weight of moisture (m), determined at 105° C., times 100 was recorded as the percentage of volatile matter ($V. M.$) on the "air dry" basis.

$$V. M. = 100 (l - m)$$

FIXED CARBON

The sum of the percentages of moisture (m), ash (a), and volatile matter ($V. M.$), was subtracted from 100 and the remainder recorded as fixed carbon ($F. C.$) on "air dry" basis.

$$F. C. = 100 - (m + a + V. M.)$$

ASH

The Sillimanite crucible, containing the residue of dried coal from the moisture determination, was placed in a muffle furnace and slowly heated until the volatile matter in the coal was driven off. The ignition in the muffle was continued at a temperature between 700 and 750° C., with occasional stirring of the ash until all particles of carbon had disappeared. The crucible with its contents was then taken from the muffle, cooled in a desiccator, and weighed. The crucible was then replaced in the muffle and the process of heating, cooling and weighing repeated until the change in weight between two successive weighings did not exceed 0.0005 gram. The weight of the crucible was deducted from the last weighing. The weight of the crucible and ash ($c+a$) minus the weight of the crucible (c) times 100 was recorded as the percentage ash (A) on the "air dry" basis.

$$A=100 (c+a-c)$$

SULFUR

After the combustion of a gram sample of 60-mesh coal in a Parr adiabatic oxygen bomb calorimeter, the bomb was washed out thoroughly with distilled water. The washings were collected in a 400 c.c. beaker, titrated with standard sodium carbonate solution (3.658 grams per liter) to obtain the "acid correction" for the heating value, and then filtered. The residue and filter were washed thoroughly with hot water. 3 c.c. of saturated bromine water followed by 3 c.c. of hydrochloric acid (2:1) were added to the filtrate and washings. The excess of bromine water was removed by heating and the sulfur precipitated with 10-20 c.c. of hot 10 per cent barium chloride solution. The solution was boiled for 20-30 minutes and allowed to stand several hours at a temperature just below boiling. The following day the solution was filtered through ashless filter paper and washed free of chlorides with hot water. The precipitate was ignited and weighed with due regard to the prevention of spattering and reduction. The weight of barium sulphate ($BaSO_4$) times 13.74 divided by the weight of the sample (s) was recorded as the percentage of sulfur (S) on "air dry" basis.

$$S=\frac{13.74 \cdot BaSO_4}{s}$$

The peroxide fusion⁷ method was also used as a check against the sulfur from the bomb washings. The results from this method usually ran higher. The results recorded were those which agreed to the nearest 0.1 per cent with the sulfur as determined by the peroxide method.

7. Parr, S. W., The analysis of fuel, gas, water, and lubricants, McGraw-Hill Book Co. Inc.

HEAT VALUE IN BRITISH THERMAL UNITS

The heat values on all coals were determined by burning 1-gram samples in an adiabatic oxygen bomb calorimeter. Briefly, the procedure for this determination consisted in placing one gram of 60-mesh coal in the clean capsule which is supported within the bomb. The fuse wire for firing was adjusted and 1 c.c. of water placed in the bottom of the bomb. The bomb was assembled and 25-30 atmospheres of oxygen added. It was then placed in the bucket which was inside the calorimeter jacket. Two liters of distilled water were added to the bucket, the jacket was closed, and the motor started, which caused circulation of water in the bucket and the jacket. Hot or cold water was admitted to the outside jacket in order to bring the temperature of the water in the jacket equal to the temperature of the water in the bucket. When a constant temperature was reached the coal was ignited by means of the electric circuit which had been previously attached. After ignition the jacketed water was advanced in temperature corresponding to the advance taking place in the inner bucket until conditions of equilibrium were again established. All temperatures were read from standardized Beckman thermometers, stem corrections were applied, and the total rise multiplied by the water equivalent of the instrument. The bomb washings were titrated with standard Na_2CO_3 to determine the acid correction. To this correction the fuse wire and sulfur corrections were added and the total correction subtracted from the product of the rise times the water equivalent. The result was multiplied by 1.8 and recorded as "air dry" B. t. u.⁸

ANALYSIS OF COMPOSITE FACE SAMPLES

The analyses in Table 2 are arranged alphabetically with respect to coal producing towns and counties.

The proximate analyses consisting of moisture, volatile matter, fixed carbon, and ash are listed in columns 4 to 7 inclusive. The per cent sulfur is found in column 8, the calorific value in column 10 and B. t. u. values in column 11.

The analyses are listed for two conditions. (1) The "as received" condition represents the sample as received at the laboratory. It represents the mine sample after it has undergone any changes that might take place during the process of preparation to 60-mesh size and placing in 4-ounce bottles. (2) The moisture-free condition represents the composition and heating value that the coal would have were there no moisture present.

The "Unit Coal" B. t. u. values represent the heat of combustion of one pound of pure coal or combustible substance. The value is calculated by substituting "as received" analysis data in the following formula:

8. For a complete and detailed procedure reference should be made to any standard publication on fuel analysis, such as, Bureau of Mines, Technical Paper 8, or Fuel, Gas, Water and Lubricants, by Parr, McGraw-Hill Book Co., N. Y.

$$\text{"Unit Coal" B. t. u.} = \frac{A - (50 \cdot S)}{100 - (m + 1.08 \cdot a + 0.55 \cdot S)}$$

A = "as received" B. t. u.; S = per cent sulfur; m = per cent moisture; and a = per cent ash.

It should be clearly understood that "Unit Coal" B. t. u. values are not an index of the quality of delivered or mine run coal. An inspection of the table which follows will show that some coals having a very high "Unit Coal" B. t. u. value are inferior to others that have a lower "Unit Coal" B. t. u. value. An inspection of the above formula will show that the dirty coal or slack from a mine will give approximately the same "Unit Coal" B. t. u. as the clean or lump coal from the same mine. A discussion of the utilization of this value will follow.

All laboratory determinations were made to the nearest 0.01 per cent; British thermal units were measured to an accuracy of 2.4 units.

The analyses reported in Table 2 are given to the nearest 0.1 per cent and the British thermal units to the nearest 10. All calculations were made with a slide rule.

Table 2.—Chemical Analysis of Composite Mine Samples

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	CONDITION	PROXIMATE ANALYSIS			SULFUR	AIR DRYING	CALORIFIC VALUES		
			MOISTURE	VOLATILE MATTER	FIXED CARBON			ASH	CALORIES	B. t. u.
COAL COUNTY	228	1	7.2	36.0	48.3	8.5	2.3	6560	11810	14140
		2	38.8	52.0	9.2	2.3	7070	12730		
	229	1	8.2	37.0	44.4	10.4	3.1	6320	11370	14250
		2	40.0	49.0	11.3	3.1	6880	12390		
	180	1	4.2	37.6	48.7	9.5	5.1	7200	12040	15340
		2	39.3	50.8	9.9	5.3	7450	13390		
181	1	4.2	38.0	47.2	10.6	5.3	7060	12700	15270	
	2	39.6	49.5	11.1	5.5	7370	13260			
CRAIG COUNTY										
Bluejacket, 3 1/4 miles southwest of; Leak Coal Co. mine, unnamed bed, composite of; Face 100 feet east of shaft bottom. Face 110 feet northeast of shaft bottom.	180	1	4.2	37.6	48.7	9.5	5.1	7200	12040	15340
		2	39.3	50.8	9.9	5.3	7450	13390		
3 1/2 miles southeast of; Peacock No. 1 mine, unnamed bed, composite of; Face at 50 feet west of shaft bottom. Face at 55 feet northwest of shaft bottom.	181	1	4.2	38.0	47.2	10.6	5.3	7060	12700	15270
		2	39.6	49.5	11.1	5.5	7370	13260		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIES	B. T. U.	"UNITS" B. T. U.
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH					
Vinita, 10 miles northwest of; Bennet Coal Co. No. 1 mine, bed unnamed; Face of main entry 100 feet north of slope bottom.	183	1	3.8	38.3	48.1	9.8	6.3	7080	12760	15170	
		2		39.8	50.0	10.2	6.6	7370	13260		
10 miles northwest of; R. L. Scott No. 1 mine, bed unnamed; Face of main entry 450 feet south of opening.	184	1	3.5	38.4	46.4	11.7	7.4	6930	12170	15140	
		2		39.8	48.1	12.1	7.7	7180	12930		
Welch, 4 miles west of; W. H. Stephenson strip pit, bed unnamed, composite of; Face of south end of pit. Middle of pit.	182	1	5.7	31.2	51.3	8.8	4.3	7080	12730	15200	
		2		36.5	51.1	9.3	4.6	7510	13510		
HASKELL COUNTY											
Kanima, ½ mile east of; Kanima Consolidated No. 1 mine, Stigler bed; Face of main entry, 850 feet from mouth of slope; McCurtain, ¼ mile north of; Stum and Barkley No. 1 mine, Panama bed; Face of 4th east entry, 300 feet from mouth of slope.	170	1	2.6	21.9	68.0	4.5	0.6	8130	14630	15850	
		2		25.6	69.8	4.6	0.6	8450	15030		
Stigler, 12 miles northeast of; Garland Coal and Mining Co. strip pit, Stigler bed, composite of; Face 300 yards from west end of pit. Face 450 yards from west end of pit.	168	1	4.4	20.6	70.2	4.8	1.3	7910	14230	15780	
		2		21.6	73.4	5.0	1.4	8270	14900		
169	1	1	2.3	21.2	68.5	5.0	0.8	8000	14400	15610	
		2		21.8	70.1	5.1	0.8	8220	14790		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIES	B. T. U.	"UNITS" B. T. U.
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH					
LATIMER COUNTY											
Gowen, ¾ mile east of; McAlester Colliery No. 1 mine, lower Hartshorne bed, composite of; Face of room 15 off 12 east entry, 3,000 feet from mouth of slope. Face of room 4 off 15 east entry, 2,740 feet from mouth of slope. Face of 7 east air course, 3,010 feet from mouth of slope.	215	1	6.1	37.1	52.3	4.5	2.1	7344	13220	14940	
		2		39.5	55.7	4.8	2.2	7822	14080		
Hartshorne, 3 miles southeast of; Hartshorne Coal Co. No. 1 mine, lower Hartshorne bed, composite of; Face of 5 east entry, 1,200 feet from mouth of slope. Face of 4 west entry, 900 feet from mouth of slope. 6 miles northeast of; Kall-Ina No. 1 mine, lower Hartshorne bed, composite of; Face of 18 west entry, 7,200 feet from mouth of slope.	216	1	6.4	35.6	48.6	9.4	3.4	6885	12400	15000	
		2		38.0	52.0	10.0	3.6	7365	13260		
Face of room 1 off 20 west entry, 5,100 feet from mouth of slope. Face of long wall off 15 west entry, 6,200 feet from mouth of slope.	214	1	3.7	37.1	52.2	6.7	1.8	7415	13340	15040	
		2		38.5	51.5	7.0	1.9	7695	13850		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	AIR DRYING LOSS	CALORIES	B. t. u.	B. t. u. UNIT
Lutie, 1½ miles east of; Hailey-Ola No. 12 mine, lower Hartshorne bed, composite of; Face of 5 west entry, 1,050 feet from mouth of slope. Face of 5 east entry, 1,100 feet from mouth of slope.	217	1	4.3	36.5	55.8	3.1	1.6	2.1	7776	14000	15216
		2		38.1	58.3	3.6	1.7		8130	14620	
Manning, 1½ miles east of; Milby-Dow No. 11 mine, lower Hartshorne bed, composite of; Face of room 14 off 2 east entry, 970 feet from mouth of slope. Face of room 17 off 1 east entry, 910 feet from mouth of slope.	212	1	5.9	34.7	55.2	4.2	1.7	3.9	7600	13690	15330
		2		36.9	58.6	4.5	1.8		7605	14560	
Red Oak, 3½ miles southeast of; J. B. Hilling No. 1 mine, lower Hartshorne bed, composite of; Face of 6 east entry, 1,050 feet from mouth of slope. Face of room 10 off 6 west entry, 410 feet from mouth of slope.	218	1	4.3	32.6	57.6	5.5	1.2	2.9	7670	13800	15430
		2		34.1	60.2	5.7	1.3		8015	14420	
Wilburton, 3 miles northwest of; M. K. & T. No. 19 mine, lower Hartshorne bed, composite of; Face of room 50 off D east entry, 3,750 feet from mouth of slope. Face of H, ½ west entry, 4,185 feet from mouth of slope. Face of room 16 off H, ½ east entry, 4,200 feet from mouth of slope.	213	1	4.8	35.6	55.0	4.6	1.1	3.1	7670	13800	15320
		2		37.4	57.8	4.8	1.2		8058	14500	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	AIR DRYING LOSS	CALORIES	B. t. u.	B. t. u. UNIT
LE FLORE COUNTY	239	1	2.7	17.1	73.6	6.6	1.3	1.9	7785	14020	15600
		2		17.5	75.6	6.8	1.3		8002	14410	
Bokoshe, 3 miles northeast of; W. S. Simpson No. 4 mine, lower Hartshorne bed, composite of; Face of 3 east entry, 774 feet from mouth of slope. Face of 1 west entry, 405 feet from mouth of slope. 3½ miles northeast of; I. X. L. No. 7 mine, lower Hartshorne bed, composite of; Face of room 3 off 2 east entry, 505 feet from mouth of slope. Face of room 2 off 3 west entry, 700 feet from mouth of slope.	238	1	2.6	16.6	75.5	5.3	1.1	1.9	7935	14280	15610
		2		17.1	77.0	5.4	1.1		8145	14660	
¼ mile northeast of; Grayston Brothers mine, lower Hartshorne bed, composite of; Face at bottom of main slope, 850 feet from mouth. Face of room 4 off 3 south entry, 1,240 feet from mouth.	237	1	2.5	17.7	72.9	6.9	0.8	1.8	7778	14000	15580
		2		18.2	74.8	7.1	0.8		7975	14360	
¼ mile north of; Rees Smokeless No. 8 mine, lower Hartshorne bed, composite of; Face of main slope, 2,050 feet from mouth of slope. Face of room 8 off 7 north, 1,610 feet from mouth of slope.	236	1	2.8	17.0	73.0	7.2	1.1	2.0	7735	13930	15610
		2		17.5	75.2	7.4	1.1		7960	14320	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIFIC VALUES		
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH			CALORIES	B. T. U.	B. T. U.
Heavener, 1 mile north of Heavener Smokeless No. 1 mine, lower Hartshorne bed, composite of: Face of room 45 off 6 south entry, 2,850 feet from mouth of slope. Face of room 45 off 6 north entry, 2,830 feet from mouth of slope.	219	1	3.4	18.8	70.0	7.8	0.7	7750	13950	15850	
		2		19.5	72.4	8.1	0.8	8028	14450		
Howe, 2½ miles southwest of; Potter Smokeless No. 7 mine, lower Hartshorne bed, composite of: Face of 2 east entry, 1,350 feet from mouth of slope. Face of 3 west entry, 1, 310 feet from mouth of slope.	230	1	4.0	19.7	68.6	7.7	1.1	7555	13600	15730	
		2		20.5	71.1	8.0	1.5	7870	14170		
4 miles southeast of; Standard No. 5 mine, lower Hartshorne bed, composite of: Face of 4 south entry, 1,175 feet from bottom of shaft. Face of 2 south entry, 1,900 feet from bottom of shaft.	220	1	4.2	18.5	68.3	9.0	1.2	7498	13500	15760	
		2		19.3	71.3	9.4	1.3	7830	14100		
2½ miles southeast of; Daves Brothers No. 4 mine, lower Hartshorne bed, composite of: Face of 4 east entry, 1,980 feet from mouth of slope. Face of room 20 off 5 east entry, 1,600 feet from mouth of slope.	221	1	4.6	19.1	69.8	6.5	1.0	7678	13820	15670	
		2		20.0	73.1	6.8	1.0	8046	14490		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIFIC VALUES		
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH			CALORIES	B. T. U.	B. T. U.
1½ miles southwest of; Potter Smokeless No. 8 mine, lower Hartshorne bed, composite of: Face of 4 west entry, 1,610 feet from mouth of slope. Face of 4 east entry, 1,800 feet from mouth of slope.	222	1	4.5	18.7	71.8	5.0	0.9	7862	14150	15750	
		2		19.6	75.2	5.2	0.9	8230	14810		
Milton, 1 mile west of; Hunter and Goodwin No. 2 mine, lower Hartshorne bed, composite of: Face of room 5 off east panel, 305 feet from mouth of slope.	240	1	3.9	17.7	72.6	5.8	1.5	7830	14100	15740	
		2		18.4	75.5	6.0	1.6	8156	14680		
Panama, 2 miles west of; Panama Smokeless No. 1 mine, lower Hartshorne bed, composite of: Face of room 1 off 1 east entry, 1,190 feet from mouth of slope. Face of room 3 off 1 west entry, 1,010 feet from mouth of slope.	235	1	3.2	16.7	75.0	5.1	0.9	7960	14330	15720	
		2		17.2	77.5	5.3	0.9	8222	14800		
3 miles west of; White Oak No. 1 mine, lower Hartshorne bed, composite of: Face of room 15 off 4 west entry, 1,705 feet from mouth of slope. Face of room 12 off 5 east entry, 1,900 feet from mouth of slope.	234	1	2.9	18.3	71.9	6.9	0.7	7760	13970	15620	
		2		18.8	74.0	7.1	0.7	7995	14390		
Poteau, 2½ miles northeast of; Poteau Machine Co. No. 1 mine, Cavanal bed, composite of: Face of long wall off 1 south entry, 700 feet from mouth of slope. Face of long wall off 2 south entry, 750 feet from mouth of slope.	223	1	2.6	20.8	67.5	9.1	3.1	7715	13880	16000	
		2		21.3	69.3	9.3	3.2	7915	14250		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS					SULFUR	AIR DRYING LOSS	CALORIES	B. t. u.	"UNIT"
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH						
1½ miles northwest of; Pure Vein No. 1 mine, Cavanal bed, composite of: Face of 4 south entry, 800 feet from mouth of slope.	221	1	2.1	21.2	66.5	10.2	3.7	1.3	7615	13700	15970	
	2	2		21.6	67.8	10.4	3.8		7768	13900		
Face of long wall off 4 north entry, 840 feet from mouth of slope.	225	1	3.1	22.8	65.8	8.3	2.0	2.2	7768	13990	15980	
		2		23.5	67.9	8.6	2.1		8029	14430		
1¼ miles west of; Mongolian No. 1 mine, Cavanal bed, composite of: Face of 1 south entry, 400 feet from mouth of slope.	226	1	2.0	22.4	67.2	8.4	2.2	1.2	7790	14030	15860	
		2		22.8	68.5	8.6	2.2		7950	14310		
Face of main slope, 310 feet from mouth of slope. 1¼ miles southwest of; Poteau Coal Corporation mine, Cavanal bed, composite of: Face of 6 north entry, 1,480 feet from mouth of slope.	227	1	3.0	22.9	65.1	9.0	2.4	2.2	7655	13770	15920	
		2		23.6	67.1	9.3	2.5		7883	14200		
Face of 6 south entry, 1,470 feet from mouth of slope. 3¾ miles southwest of; Oakland No. 1 mine, Cavanal bed, composite of: Face of 3 left entry, 750 feet from mouth of slope. Face of 4 right entry, 685 feet from mouth of slope.	227	1	3.0	22.9	65.1	9.0	2.4	2.2	7655	13770	15920	
		2		23.6	67.1	9.3	2.5		7883	14200		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS					SULFUR	AIR DRYING LOSS	CALORIES	B. t. u.	"UNIT"
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH						
Tahona, ¼ mile south of; Superior Smokeless No. 29 mine, lower Hartshorne bed, composite of: Face of room 14 off 9 west entry, 3,864 feet from mouth of slope. Face of room 24 off 8 east entry, 3,960 feet from mouth of slope. Face of room 35 off 8 west entry, 5,100 feet from mouth of slope.	233	1	2.6	17.1	72.0	8.3	0.7	1.7	7700	13860	15690	
		2		17.5	73.9	8.5	0.7		7898	14220		
1 mile southwest of; Covington Slope No. 7 mine, lower Hartshorne bed, composite of: Face of room 45, 910 feet from mouth of slope. Face of room 47, 970 feet from mouth of slope.	231	1	2.6	16.8	74.0	6.6	0.7	1.6	7850	14130	15690	
		2		17.3	76.0	6.8	0.7		8055	14500		
Williams, 2 miles west of; Acme Semianthracite mine, lower Hartshorne bed, composite of: Face of room 4 off 2 east entry, 1,510 feet from mouth of slope. Face of 3 west entry, 1,565 feet from mouth of slope.	232	1	3.3	16.7	72.2	7.8	0.7	2.1	7705	13880	15730	
		2		17.3	74.7	8.1	0.7		7970	14350		
Chelsa, 2½ miles south of; Chelsa Coal Co. strip pit, Dawson bed, (New pit; part of coal under water), composite of: Face 50 feet from west end of pit. Face 100 feet from west end of pit.	178	1	9.5	36.5	45.0	9.0	4.5	6.6	6700	12050	15100	
		2		40.0	50.1	9.9	5.0		7400	13310		

MAXES COUNTY

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIFIC VALUES	
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH			CALORIES	B. T. U.
2½ miles south of: French and York strip pit, Dawson bed; Face 100 yards from north end of pit. Face 150 yards from north end of pit.	179	1	4.2	38.4	51.2	8.2	4.6	7170	12910	15010
		2		38.0	53.4	8.5	4.8	7415	13340	
MUSKOGEE COUNTY										
Porum, 6 miles northeast of: Trojan Coal Co. strip pit, Stigler bed, composite of: Face at middle of pit. Face at point 300 yards east of middle of pit.	171	1	2.8	29.2	59.6	8.4	3.8	7650	13780	15790
		2		30.0	61.4	8.6	3.9	7875	14170	
OKMULGEE COUNTY										
Dewar, 1½ miles northeast of: Wadsworth No. 1 mine, Henryetta (Senora formation) bed, composite of: Face of 5 east entry, 1,200 feet from mine mouth. Face of room 1 off 8 east-30 west entry, 1,775 feet from mine mouth.	158	1	6.5	35.0	51.3	7.2	3.7	6955	12510	14740
		2		37.4	54.9	7.7	4.0	7435	13380	
Henryetta, 1½ miles southwest of: Wise-Buchanan No. 1 mine, Henryetta. (Senora formation) bed. Composite of: Face of room 17 off 7 south off main east entry, 2,450 feet from shaft. Face of main west entry, 1,450 feet from bottom of shaft. Face on rib of 1 north off main east entry, 1,900 feet from shaft.	159	1	7.9	34.2	52.6	5.3	1.2	7085	12760	14820
		2		37.2	57.0	5.8	1.3	7700	13850	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS				SULFUR	AIR DRYING LOSS	CALORIFIC VALUES	
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH			CALORIES	B. T. U.
½ mile east of: Pittsburg Midway No. 12 mine, Henryetta (Senora formation) bed, composite of: Face of room 4 off 8 south entry, 2,800 feet from bottom of shaft. Face of room 16 off main east entry, 2,600 feet from bottom of shaft. Face of room 38 off 6 south entry, 2,850 feet from bottom of shaft.	160	1	8.5	33.0	53.5	5.0	1.4	7115	12810	14930
		2		36.0	58.5	5.5	1.5	7780	14010	
5½ miles northeast of: Kincaide No. 1 mine, Henryetta (Senora formation) bed, composite of: Face of 1 west off main south entry, 2,550 feet from mouth of slope. Face of room 2 off 1 east off main entry, 2,250 feet from mouth of slope.	161	1	6.1	34.9	50.9	7.8	3.1	6985	12570	14890
		2		37.3	54.4	8.3	3.3	7460	13430	
5 miles northeast of: Kincaide No. 2 mine, Henryetta (Senora formation) bed, composite of: Face of main west entry, 1,000 feet from shaft bottom. Face of 5 south entry, 975 feet from shaft bottom.	162	1	8.6	31.9	53.7	5.8	2.1	6970	12550	14840
		2		31.9	58.8	6.3	2.3	7625	13730	
1½ miles east of: McGinnis No. 1 mine, Henryetta (Senora formation) bed, composite of: Face of main west entry, 1,500 feet from bottom of shaft. Face of room 7 off 5 south entry, 1,250 feet from bottom of shaft. Face of room 8 off 5 north entry, 1,275 feet from bottom of shaft.	163	1	8.2	32.1	54.0	5.7	1.2	6985	12570	14770
		2		35.0	58.8	6.2	1.3	7615	13710	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES				
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULFUR	AIR DRYING LOSS	CALORIES	B. T. U.	B. T. U. "UNIT"	
1½ miles northeast of: Warden-Pullen No. 2 mine. Henryetta (Senora formation) bed, composite of: Face of room 70 off 1 north entry, 2,200 feet from bottom of shaft. Face of 1 west entry, 30 feet from 4th north, 2,500 feet from bottom of shaft. Face of room 14 off 3 south-main, 1,900 feet from bottom of shaft.	164	1	7.0	34.9	53.5	4.6	1.1	2.6	7320	13180	15020	
		2		37.5	57.5	4.9	1.2		7870	14170		
	7 miles northeast of: Red Herron mine No. 1, Henry- etta (Senora formation) bed, composite of: Face of room 10 off 11 north back entry, 3,900 feet from mouth of slope. Face of main west back entry, 4,100 feet from mouth of slope.	166	1	7.8	34.0	51.8	6.4	1.6	3.1	7040	12680	14930
			2		36.9	56.2	6.9	1.7		7640	13750	
1½ miles northeast of: Gem mine No. 1, Henryetta (Senora formation) bed: Face of room 4 off main north entry, 2,500 feet from bottom of shaft.	165	1	7.7	34.3	51.2	6.8	1.9	2.9	7065	12720	15050	
		2		37.2	55.4	7.1	2.1		7650	13780		
5 miles northeast of: Sun No. 1 mine, Henryetta (Se- nora formation) bed, composite of: Face of room 39 off main entry, northeast, 4,050 feet from slope mouth. Face of room 50 off 1 east of southeast entry, 4,200 feet from slope mouth. Face of room 25 off 1 south entry, 2,750 feet from slope mouth.	157	1	7.5	33.6	50.8	8.1	3.0	3.8	6860	12350	14850	
		2		36.4	54.8	8.8	3.2		7420	13360		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	B. T. U. "UNIT"
4½ miles northeast of: Star No. 2 mine, Henryetta (Senora formation) bed, composite of: Face of 1 south back entry, 1,200 feet from mouth of shaft. Face of 3 north entry, 1,250 feet from mouth of shaft. Face at main east entry.	154	1	7.6	34.6	52.0	4.9	2.5	4.5	7185	12950	14960
		2		37.5	57.2	5.3	2.7		7790	14020	
2 miles northeast of: Atlas Coal Co. No. 1 mine, Hen- ryetta (Senora formation) bed, composite of: Face of room 6 off main west entry, 4,400 feet from mouth of mine. Face of room 6 off 4 east entry, 4,500 feet from mouth of mine. Face of room 8 off 1 north entry, 2,550 feet from mouth of mine.	155	1	7.5	35.0	52.8	4.7	1.8	3.2	7180	12930	14880
		2		37.8	57.1	5.1	1.9		7765	13990	
Okmulgee, 4½ miles southeast of: Gaither No. 1 mine, Hen- ryetta (Senora formation) bed, composite of: Face of 1 south entry, 850 feet from mouth of slope. Face of main southwest entry, 700 feet from mouth of slope.	167	1	7.7	29.0	51.3	12.0	4.2	3.3	6500	11700	14910
		2		31.4	55.6	13.0	4.5		7045	12680	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. t. u.	"UNIT" B. t. u.
Schuler, $\frac{1}{2}$ mile west of; B. and A. No. 2 mine, Henryetta (Senora formation) bed, composite of: Face of room 1 in south entry off west, 1,700 feet from shaft bottom. Face of main west entry, across from air course, 1,750 feet from shaft bottom. Face of room 5 on 6 north off main west entry, 1,400 feet from shaft bottom.	156	1	6.9	35.2	49.4	8.5	3.3	3.3	6835	12175	15000
		2		37.8	53.1	9.1	3.8		7440	13400	
PITTSBURG COUNTY											
Adamson, 2 miles east of; Pierce No. 1 mine, lower Harts- horne bed, composite of: Face of room 36 off 8 west entry, 2,325 feet from mouth of slope. Face of room 32 off 10 east entry, 2,520 feet from mouth of slope. 5 miles west of; Pittsburg County Coal Co. No. 5, Mc- Alester bed, composite of: Face of 9 west entry, 1,200 feet from mouth of slope. Face of 9 east entry, 1,175 feet from mouth of slope. Face of room 12 off 6 west entry, 1,285 feet from mouth of slope.	196	1	4.4	35.5	56.1	4.0	1.7	2.5	7715	13880	15280
		2		37.1	58.7	4.2	1.8		8070	14520	
	194	1	3.6	33.5	56.9	6.0	0.6	1.3	7580	13640	15200
		2		34.7	59.1	6.2	0.6		7865	14160	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. t. u.	"UNIT" B. t. u.
$\frac{1}{2}$ mile northeast of; Adamson No. 7 mine, McAlester bed, composite of: Face of room 14 off 5 west entry, 1,320 feet from mouth of slope Face of room 14 off 5 east entry, 1,340 feet from mouth of slope. Bache, 2 $\frac{1}{2}$ miles northwest of; Richards-Thompson No. 5 mine, McAlester bed, composite of: Face of 5 east entry, 1,200 feet from mouth of slope. Face of room 17 off 4 east entry, 1,510 feet from mouth of slope. Blanco, 2 miles southwest of; Blanco Coal Co. No. 2 mine, McAlester bed, composite of: Face of 6 west entry, 1,650 feet from mouth of slope. Face of room 77 off 3 west entry, 2,750 feet from mouth of slope. Dow, 2 miles northwest of; Milby-Dow No. 10 mine, Mc- Alester bed, composite of: Face of room 13 off 10 east entry, 2,840 feet from mouth of slope. Face of room 9 off 10 east entry, 2,720 feet from mouth of slope.	193	1	3.9	33.6	57.0	5.5	0.8	1.3	7540	13570	15100
		2		35.0	59.3	5.7	0.8		7850	14130	
	198	1	4.6	35.0	56.3	4.1	0.6	2.6	7700	13850	15250
		2		36.7	59.0	4.3	0.6		8065	14510	
	191	1	6.1	35.4	52.6	5.9	0.9	1.8	7065	12710	14550
		2		37.7	56.0	6.3	1.0		7515	13530	
200	1	1	4.1	34.7	56.1	5.1	0.8	1.6	7540	13560	15040
		2		36.2	58.3	5.3	0.8		7850	14140	

Table 2.—Chemical Analysis of Composite Mine Samples—Continued.

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS					SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	"UNIT"
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH						
1 mile west of Milby-Dow No. 9 mine, McAlister bed, composite of: Face of 3 south entry, 3,200 feet from mouth of slope. Face of room 10 off 2 north entry, 4,150 feet from mouth of slope. Face of room 107 off main south, 5,876 feet from mouth of slope. Haileyville, 3 miles northeast of; Messina Coal Co. No. 2 mine, lower Hartshorne bed, composite of: Face of room 17 off 7 east entry, 3,900 feet from mouth of slope. Face of 7 west entry, 3,100 feet from mouth of slope. Face of cross cut at bottom of slope, 3,200 feet from mouth. Hartshorne, 4 miles northeast of; Rock Island No. 12 mine, lower Hartshorne bed: Face of 9 east slope, 3,900 feet from shaft. Face of 3 east off main west plain, 3,700 feet from shaft. Face of main west slope, 4,100 feet from shaft.	199	1	4.2	34.6	56.1	1.8	0.6	1.7	7485	13470	14910	
			2		36.1	57.9	3.0	0.6		7810	14080	
		197	1	3.6	37.2	52.1	7.1	1.9	1.6	7470	13440	15210
			2		38.6	51.0	7.4	2.0		7715	13940	
		203	1	3.8	37.2	52.1	6.9	1.3	1.7	7400	13310	15050
			2		38.7	51.1	7.2	1.1		7635	13810	
		207	1	4.1	35.6	52.8	7.5	2.0	1.9	7360	13210	15160
			2		37.1	55.1	7.8	2.1		7700	13810	
		208	1	4.1	37.4	52.2	8.7	2.2	1.9	7150	12860	15020
			2		36.3	54.6	9.1	2.3		7475	13450	

Table 2.—Chemical Analysis of Composite Mine Samples—Continued.

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	LABORATORY NO.	SAMPLE CONDITION	PROXIMATE ANALYSIS					SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	"UNIT"
			MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH						
Face of 11 main east plane, 4,600 feet from shaft. Composite of; 206, 207, 208, and 209 (averaged*): Composite of; 206, 207, 208, and 209; (mixed sample): 3 miles east of; Rock Island No. 10 mine, lower Hartshorne bed: Face of room 38 off 4 east off main south, 3,000 feet from mouth of shaft. Face of room 19 off 5 east, 2,200 feet from bottom of shaft. Face of room 1 off 8 east, 3,200 feet from bottom of shaft. Composite of; 201, 202, and 203 (averaged*): Composite of; 201, 202, and 203 (mixed sample): 1 mile east of; Rock Island No. 7 mine, lower Hartshorne bed, composite of: Face of air course off 10 west entry, 4,100 feet from shaft. Face of main north entry, 4,250 feet from shaft. Face of 4 south entry, 4,270 feet from shaft.	209	1	4.8	35.2	54.9	5.1	1.1	2.7	7480	13480	15080	
			2		37.0	57.6	5.4	1.2		7865	14160	
		206	1	4.3	36.3	52.3	7.0	1.7	2.0	7348	13222	15078
			2		37.3	55.3	7.1	1.8		7681	13815	
		210	1	4.1	36.0	52.8	7.1	1.9	2.0	7350	13230	15050
			2		37.3	55.1	7.4	2.0		7665	13800	
		201	1	3.3	38.8	49.3	8.6	2.7	1.4	7400	13320	15200
			2		40.0	51.1	8.9	2.8		7660	13780	
		202	1	3.5	36.9	51.9	7.7	2.6	1.2	7400	13320	15080
			2		38.2	53.8	8.0	2.7		7665	13800	
	203	1	3.1	38.3	48.6	10.0	2.2	1.1	7270	13090	15270	
		2		39.5	50.2	10.3	2.3		7500	13500		
	204	1	3.3	38.0	49.9	8.8	2.8	1.2	7357	13243	15183	
		2		39.2	51.7	9.1	2.6		7608	13693		
	201	1	3.2	38.3	49.7	8.6	2.7	1.2	7310	13210	15160	
		2		39.8	51.3	8.9	2.8		7580	13650		
	205	1	4.4	36.7	50.9	8.0	2.0	2.5	7310	13160	15200	
		2		38.4	53.2	8.4	2.1		7645	13770		

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORATORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	B. T. U. UNIT
North McAlester, $\frac{1}{2}$ mile west of; Old Town Coal Co. mine. McAlester bed, composite of: Face of 7 west entry, 5,000 feet from mouth of slope. Face of 7 east entry, 100 feet off slope and 5,050 feet from mouth of slope.	187	1	3.4	35.7	56.0	4.9	0.8	1.3	7603	13700	15010
		2		37.0	57.9	5.1	0.8		7875	14180	
Manning, $\frac{1}{4}$ mile north of; Manning No. 4 mine, McAlester bed, composite of: Face of 3 west entry, 510 feet from mouth of slope. Face of room 9 off 2 east entry, 540 feet from mouth of slope.	195	1	4.3	37.7	56.3	5.7	0.9	1.5	7485	13170	15070
		2		35.2	58.8	6.0	0.9		7820	14080	
McAlester, 6 miles east of; Carbon No. 4 mine, McAlester bed, composite of: Face of room 12 off 1 west entry, 700 feet from mouth of slope. Face of 3 west, 900 feet from mouth of slope. 3 miles west of; Julien No. 1 mine, McAlester bed, composite of: Face at 120 feet west main slope, 1,000 feet from mouth.	211	1	4.2	33.0	57.8	5.0	0.5	1.8	7515	13510	14950
		2		34.4	60.4	5.2	0.5		7830	14100	
Pittsburg, $1\frac{1}{2}$ miles west of; McAlester-Edwards No. 4 mine, McAlester bed, composite of: Face of cross cut off main slope, 700 feet from mouth of slope. Face of room 9 off 3 east entry, 400 feet from main slope.	186	1	5.3	36.0	53.3	5.4	0.8	2.5	7335	13200	14850
		2		38.0	56.3	5.7	0.8		7745	13910	
Pittsburg, $1\frac{1}{2}$ miles west of; McAlester-Edwards No. 4 mine, McAlester bed, composite of: Face of cross cut off main slope, 700 feet from mouth of slope. Face of room 9 off 3 east entry, 400 feet from main slope.	190	1	5.7	35.0	51.1	6.2	1.2	1.6	7135	12810	14700
		2		37.1	54.2	6.6	1.3		7565	13620	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORATORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	B. T. U. UNIT
$\frac{1}{2}$ mile north of; McAlester-Edwards No. 2 mine, McAlester bed, composite of: Face of room 49 off 11 west entry, 4,700 feet from mouth of slope. Face of room 3 off panel B, 3,540 feet from mouth of slope. Face of room 35 off 11 east entry, 3,750 feet from mouth of slope.	189	1	4.9	35.7	52.1	7.3	2.1	1.5	7165	12900	14880
		2		37.6	51.7	7.7	2.5		7535	13570	
3 miles west of; McAlester-Edwards No. 3 mine, McAlester bed, composite of: Face of room 29 off 7 east entry, 2,650 feet from mouth of slope. Face of room 57 off 5 east entry, 2,600 feet from mouth of slope.	188	1	6.0	34.6	52.9	6.5	1.5	2.0	7075	12760	14710
		2		36.8	56.3	6.9	1.6		7540	13580	
Savanna, 2 miles south of; Pfeiffer Coal Co. No. 1 mine, McAlester bed, composite of: Face of room 2 off 3 north entry, 580 feet from mouth of slope. Face of 3 north entry, 610 feet from mouth of slope.	192	1	5.9	36.0	53.0	5.1	1.6	3.1	7255	13030	14810
		2		38.2	56.4	5.4	1.7		7715	13890	
4 miles southeast of; Southern No. 4 mine, McAlester bed, composite of: Face of 13 north entry, 2,175 feet from mouth of slope. Face of 13 south entry, 2,200 feet from mouth of slope.	185	1	4.5	35.7	52.5	6.3	1.7	1.5	7305	13160	14880
		2		37.4	56.0	6.6	1.8		7655	13780	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.	"UNIT" B. T. U.
ROGERS COUNTY Bushyhead, 1½ miles north of; Bushyhead Coal Co. No. 1 strip pit. Fort Scott bed, composite of;† Face near middle of pit. Face, south end of pit.	177	1	8.2	31.5	51.3	6.0	1.0	3.9	7000	12500	11800
		2		31.3	59.2	6.5	1.1		7620	13720	
TULSA COUNTY Collinsville, 1½ miles southwest of; Tulsa County Coal Co. strip pit. Dawson bed, composite of; Face near middle of pit. Face 200 yards north of middle of pit. Tulsa, 4½ miles east of; Henry Adamson No. 1 mine, Daw- son bed, composite of; Face of room 13 off 5 west entry, 3,000 feet from bottom of shaft. Face of main west entry, 3,050 feet from bottom of shaft. 4½ miles east of, on 15th St.; Pauline No. 1 mine, Dawson bed, composite of; Face of room 14 off 2 west entry, 2,000 feet from bottom of shaft. Face of main south entry, 2,500 feet from bottom of shaft. Face of room 6 off 2 east entry, 2,500 feet from bottom of shaft.	176	1	4.2	37.5	46.6	11.7	4.7	1.4	6995	12590	15130
		2		39.1	48.7	12.2	4.9		7300	13140	
	172	1	6.4	36.0	49.1	8.5	3.8	2.8	6930	12180	14940
		2		38.5	52.4	9.1	4.1		7400	13320	
	173	1	6.6	35.8	45.5	12.1	4.5	2.9	6685	12030	15170
		2		38.3	48.7	13.0	4.8		7160	12890	

Table 2.—*Chemical Analysis of Composite Mine Samples—Continued.*

TOWN, DISTANCE FROM MINE, BED, AND PLACE IN MINE	SAMPLE		PROXIMATE ANALYSIS					CALORIFIC VALUES			
	LABORA- TORY NO.	CONDITION	MOISTURE	MOISTURE	VOLATILE MATTER	FIXED CARBON	ASH	SULPHUR	AIR DRYING LOSS	CALORIES	B. T. U.
4½ miles northeast of Tulsa; Leavell Coal Co. No. 1 mine, Dawson bed, composite of; Face of stripped seam near middle of pit. Face of stripped seam 150 yards northwest of middle of pit. Face of main entry in drift mine, 1,200 feet from opening.	174	1	5.8	35.5	50.1	8.6	3.9	1.7	7015	12620	15010
		2		37.7	53.2	9.1	4.1		7385	13300	
WAGONER COUNTY Broken Arrow, 3 miles east of; Seneca Coal and Coke Co. strip pit, unnamed bed, composite of; Face near center of pit. Face 200 yards south of center of pit.	175	1	5.2	35.9	51.5	7.4	3.5	1.9	7080	12750	14820
		2		37.9	51.3	7.8	3.7		7470	13450	

*—These mines were sampled in this manner in order to show the discrepancy which would exist between the analyses of samples crushed and mixed in the mine and those which were the result of averaging the analyses from different points within the mine.

†—Samples taken from points selected by superintendent.

DESCRIPTION OF MINES AND SAMPLES⁹

The descriptions that follow have been compiled from records made by the senior author while taking samples at the mine. They give information about the mines that is not contained in Table 2. They also give detailed information concerning the impurities and streaks found in the seams and the methods used in mining and preparing the coals for shipment.

COAL COUNTY

E. H. Noles Coal Co. Mine, Coalgate.

Analysis 228, page 17. Bituminous coal, Coalgate-Lehigh district, from E. H. Noles; M. K. & T. No. 2 mine, a slope mine, 5 miles northeast of Coalgate, on the Missouri, Kansas & Texas Railroad. Coal bed, McAlester; thickness of bed, 2 feet 10 inches to 4 feet. Average cover at points sampled, 400 feet. The bed was measured and sampled at three points by J. E. Moose and R. H. Brown, August 6, 1928, as described below:

Sections of coal bed in E. H. Noles-M. K. & T. No. 2 Mine.

(Laboratory No. 228)

SECTION	A		B		C	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, soft soapstone						
Coal		3		5½		4½
Mother coal						
Coal		4½		1½		1½
Pyrites						
Coal		2½		2½	1	1
Pyrites						½
Coal		6		6½		11
Pyrites						
Coal		6½		9½		7½
Pyrites						
Coal		10½		6½	1	2
Streak						
Floor, soft clay						
Thickness of bed	2	9½	3	7½	4	3½
Thickness of sample	2	9½	3	7½	4	3½

Section *A* was cut from face of 5 west entry, 2,100 feet from mouth of slope; section *B* was cut from face of room 4 off 4 west entry, 2,050 feet from mouth of slope; section *C* was cut from face of room 56 off 1 east entry, 3,260 feet from mouth of slope.

9. The form employed in the following descriptions is similar to that used by J. N. Geyer in Technical Paper 411, of the Bureau of Mines.

System of mining, room and pillar and panel. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes on screens and picked on cars. The daily output at time of sampling was 500 tons.

Keystone Coal and Mining Co. No. 1 Mine, Coalgate

Analysis 229, page 17. Bituminous coal, Coalgate-Lehigh district, from Keystone No. 1 mine, a slope mine, 3½ miles southwest of Coalgate, on the Saute Fe Railroad. Coal bed, McAlester; thickness of bed, 3 feet 5 inches. Average cover at points sampled, 395 feet. The bed was measured and sampled at two points, August 6, 1928, as described below:

Sections of coal bed in Keystone No. 1 mine

(Laboratory No. 229)

SECTION	A		B	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, soapstone				
Coal		3½		1
Pyrites				
Coal		6		1
Pyrites				
Coal		7	1	1½
Pyrites				
Coal		4		6
Streak				
Coal		6		7
Pyrites				
Coal		9	1	4
Floor, soft clay				
Thickness of bed	3	1½	3	5½
Thickness of sample	3	1½	3	5½

Section *A* was cut from face of 8 west entry, 2,490 feet from mouth of slope; section *B* was cut from face of long wall off 3 west entry, 1,200 feet from mouth of slope.

System of mining, room and pillar and long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, 1¼-inch and slack sizes on shaker screens and picked on cars. The daily output at time of sampling was 200 tons.

CRAIG COUNTY

Leak Coal Co. Mine, Bluejacket

Analysis 180, page 17. Bituminous coal, northeastern Oklahoma district, from Leak Coal Co. mine, a shaft mine, $3\frac{3}{4}$ miles southwest of Bluejacket, a wagon mine. Coal bed, unnamed; thickness of bed, 2 feet 9 inches. Cover at points sampled, 50 feet. The bed was measured and sampled at two points by pit foreman according to directions of J. E. Moose, June 19, 1928, as described below:

Sections of coal bed in Leak Coal Co. Mine

(Laboratory No. 180)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandstone				
Coal.....	2	9	2	6
Thickness of bed.....	2	9	2	6
Thickness of sample.....	2	9	2	6

Section *A* was cut from face, 400 feet east of shaft bottom; section *B* was cut from face, 410 feet northeast of shaft bottom.

System of mining, modified long wall. Coal shot from solid with black powder; permissible explosive used on roof. Coal was separated into mine run sizes. The daily output at the time of sampling was 50 tons.

C. Snodderly Coal Co. Mine, Bluejacket

Analysis 181, page 17. Bituminous coal, northeastern Oklahoma district, from Peacock No. 1 mine, a shaft mine, $3\frac{1}{2}$ miles southwest of Bluejacket, a wagon mine. Coal bed, unnamed; thickness of bed, 2 feet 2 inches. Cover at points sampled, 35 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, July 10, 1928, as described below:

Sections of coal bed in Peacock No. 1 mine

(Laboratory No. 181)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandstone				
Coal.....	2	2	2	4
Floor, smooth shale				
Thickness of bed.....	2	2	2	4
Thickness of sample.....	2	2	2	4

Section *A* was cut from face at 50 feet west of shaft bottom; section *B* was cut from face at 55 feet northwest of shaft bottom. System of mining, modified long wall. Coal shot from solid with black powder; permissible explosive used on roof. Coal was shipped in mine run sizes. The daily output at time of sampling was 15 tons.

W. H. Stephenson Mine, Welch

Analysis 182, page 18. Bituminous coal, northeastern Oklahoma district, from W. H. Stephenson strip pit, a wagon mine, 4 miles west of Welch. Coal bed, unnamed; thickness of bed, 2 feet. Cover at point sampled, 12 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, July 11, 1928, as described below:

Sections of coal bed in W. H. Stephenson mine

(Laboratory No. 182)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale and clay				
Coal.....	1	4	1	4 $\frac{1}{2}$
Bone.....		$\frac{1}{4}$		$\frac{1}{4}$
Coal.....	1	1	1	0
Floor				
Thickness of bed.....	2	5 $\frac{1}{4}$	2	4 $\frac{3}{4}$
Thickness of sample.....	2	5 $\frac{1}{4}$	2	4 $\frac{3}{4}$

Section *A* was cut from face of south end of pit; section *B* was cut from face at middle of pit.

System of mining, stripped with steam shovel. Coal shot with black powder. Coal was separated into lump and run of mine sizes and picked at wagon cars. The daily output at time of sampling was 50 tons.

Bennett Coal Co. Mine, Vinita

Analysis 183, page 18. Bituminous coal, northeastern Oklahoma district, from Bennett Coal Co. No. 1 mine, a slope mine, 10 miles northwest of Vinita. Coal bed, unnamed; thickness of bed, 2 feet 7 inches. Cover at point sampled, 16 feet. The bed was measured and sampled at one point by J. E. Moose and W. R. Rutherford, July 11, 1928, as described below:

Section of coal bed in Bennett Coal Co. mine

(Laboratory No. 183)

SECTION	A	
	<i>Ft.</i>	<i>in.</i>
Roof, sandstone.....		
Coal.....	2	7
Thickness of bed.....	2	7
Thickness of sample.....	2	7

Section *A* was cut from face of main entry 100 feet north of slope bottom.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into run of mine sizes. The daily output at time of sampling was 10 tons.

R. L. Scott Mine, Vinita

Analysis 184, page 18. Bituminous coal, northeastern Oklahoma district, from R. L. Scott mine, a drift mine, 10 miles northwest of Vinita. Coal bed, unnamed; thickness of bed 2 feet 7 inches. Cover at point sampled, 18 feet. The bed was measured and sampled at one point by J. E. Moose and W. R. Rutherford, July 11, 1928, as described below:

Section of coal bed in R. L. Scott No. 1 mine

(Laboratory No. 184)

SECTION	A	
	<i>Ft.</i>	<i>in.</i>
Roof, sandstone		
Coal.....	2	7
Thickness of bed.....	2	7
Thickness of sample.....	2	7

Section *A* was cut from face of main entry, 450 feet south of opening.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into run of mine sizes. The daily output at time of sampling was 10 tons.

HASKELL COUNTY

Stum and Barkley Mine, McCurtain

Analysis 168, page 18. Semibituminous coal, McCurtain-Massey district, from Stum and Barkley mine, a slope mine, ¼ mile north of McCurtain, on the Ft. Smith & Western Railroad. Coal bed, Panama; thickness of bed, 7 feet 2 inches. Cover at point sampled, 83 feet. The bed was measured and sampled at one point by J. E. Moose and W. R. Rutherford, July 3, 1928, as described below:

Section of coal bed in Stum and Barkley No. 1 mine

(Laboratory No. 168)

SECTION	A	
	<i>Ft.</i>	<i>in.</i>
Roof, slate, 2 in. draw slate		
Coal.....	2	8
Shale band.....		8
Coal.....	3	10
Floor, hard shale		
Thickness of bed.....	7	2
Thickness of sample.....	6	6

Section *A* was cut from face of 4th east entry, 300 feet from mouth of slope. System of mining, panel. Coal cut by hand pick and shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on grizzly screens and picked on cars. The daily output at time of sampling was 40 tons.

Garland Coal and Mining Co. Mine, Stigler

Analysis 169, page 18. Bituminous coal, Stigler-Tamaha Oklahoma district, from Garland Coal and Mining Co. strip pit, 12 miles northeast of Stigler on the Midland Valley Railroad. Coal bed, Stigler vein; thickness, 2 feet 3 inches. Cover at point sampled, 27 feet. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, July 5, 1928, as described below:

Sections of coal bed in Garland Coal and Mining Co.

(Laboratory No. 169)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale and clay				
Bony coal.....	2	1	2	1
Coal.....		3		3

System of mining, shale and clay stripped with steam shovel. Coal shot from solid with 3rd and 4th powder and loaded by hand and shovel. Average daily output, 500 tons, all from advance workings.

Kanima Consolidated Coal Co. Mine, Kanima

Analysis 170, page 18. Bituminous coal, Stigler-Tamaha district, from Kanima Consolidated No. 1 mine, a slope mine, ½ mile east of Kanima, on the Midland Valley Railroad. Coal bed, Stigler vein; thickness of bed, 1 foot 10 inches. Cover at point sampled, 200 feet. The bed was measured and sampled at one point by J. E. Moose and W. R. Rutherford, July 5, 1928, as described below:

Section of coal bed in Kanima Consolidated No. 1 mine

(Laboratory No. 170)

SECTION	A	
	<i>Ft.</i>	<i>in.</i>
Roof, slate		
Coal.....	1	10
Floor, shale		
Thickness of bed.....	1	10
Thickness of sample.....	1	10

Section *A* was cut from face of main entry, 850 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by pick and shot from solid with black powder; permissible explosive used on roof. Coal was separated into mine run sizes and loaded on automobile trucks. The daily output at time of sampling was 20 tons.

LATIMER COUNTY

Aberdeen Coal Co. Mine, Manning

Analysis 212, page 20. Bituminous coal, Hartshorne district, from Milby-Dow No. 11 mine, a slope mine, 1½ miles east of Manning, on the Missouri, Kansas & Texas Railroad. Coal bed, lower Hartshorne; thickness of bed, 4 feet 2 inches. Cover at points sampled; *A*, 275 feet, *B*, 170 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 30, 1928, as described below:

Sections of coal bed in Milby-Dow No. 11 mine

(Laboratory No. 212)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandstone				
Coal.....	2	2½	2	2
Pyrites.....				
Coal.....	1	11½	2	0
Floor, slate				
Thickness of bed.....	4	2	4	2
Thickness of sample.....	4	2	4	2

Section *A* was cut from face of room 14 off 2 east entry, 970 feet from mouth of slope; section *B* was cut from face of room 17 off 1 east entry, 910 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes on screens. The daily output at time of sampling was 200 tons.

M., K. & T. Coal Co. Mine, Wilburton

Analysis 213, page 20. Bituminous coal, Wilburton district, from M. K. & T. No. 19 mine, a slope mine, 3 miles northwest of Wilburton, on the Missouri, Kansas, and Texas Railroad. Coal bed, lower Hartshorne; thickness of bed, 5 feet to 5 feet 5 inches. Cover at points sampled: *A*, 50 feet; *B*, 110 feet; *C*, 95 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 30, 1928, as described below:

Sections of coal bed in M. K. & T. No. 19 mine

(Laboratory No. 213)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, smooth sandstone, 8 to 10 ft., heavy at sections B & C						
Coal.....	7		2	2	2	2
Pyrites.....				1		1
Coal.....	2	5		5		6
Pyrites and mother coal.....						
Coal.....				3		9
Coal.....			1	4	1	1
Pyrites.....						
Coal.....				6		7
Floor, sandstone & slate						
Thickness of bed.....	5	0	4	9	5	2
Thickness of sample.....	5	0	4	9	5	1

Section *A* was cut from face of room 50 off *D* east entry, 3,750 feet from mouth of slope; section *B* was cut from face of *H*, 1/2 west entry, 4,185 feet from mouth of slope; section *C* was cut from face of room 16 off *H*, 1/2 east entry, 4,200 feet from mouth of slope.

System of mining, room and pillar and pulling pillars. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into mine run sizes on bar screens. The daily output at time of sampling was 350 tons.

Kali-Inla Coal Co. Mine, Hartshorne

Analysis 214, page 19. Bituminous coal, Hartshorne district, from Kali-Inla No. 1 mine, a slope mine, 6 miles northeast of Hartshorne, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 5 inches to 4 feet. Average cover at points sampled, 600 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 31, 1928, as described below:

Sections of coal bed in Kali-Inla No. 1 mine

(Laboratory No. 214)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and sandstone						
Coal.....		6		9		9
Pyrites.....						
Coal.....	1	5		4	1	8
Mother Coal.....						
Coal.....	1	4	1	1		4
Streak.....						
Coal.....				16	1	
Streak.....						3
Coal.....			1	3		
Floor, hard slate						
Thickness of bed.....	3	4	4	1	4	0
Thickness of sample.....	3	4	3	11	4	0

Section *A* was cut from face of 18 west entry, 7,200 feet from mouth of slope; section *B* was cut from face of room 1 off 20 west entry, 5,400 feet from mouth of slope; section *C* was cut from face of long wall off 15 west entry, 6,200 feet from mouth of slope.

System of mining, room and pillar and long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2 1/4-, and 1 1/4-inch sizes on shaker screens. The daily output at time of sampling was 450 tons.

McAlester Colliery Co. Mine, Gowen

Analysis 215, page 19. Bituminous coal, Hartshorne district, from McAlester Colliery No. 1 mine, a slope mine, 3/4 mile east of Gowen, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 2 feet 6 inches to 3 feet 9 inches. Average cover at points sampled, 200 feet. The bed was measured and sampled at three points by J. E. Moose and R. H. Brown, August 1, 1928, as described below:

Sections of coal bed in McAlester Colliery Co. No. 1 mine

(Laboratory No. 215)

SECTION	A		B		C	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, sandstone and slate						
Coal.....	1	8	1	6½		8
Pyrites.....		½		½		
Coal.....		7½		4		4½
Mother coal.....				½		
Coal.....	1	6	1	2		7
Pyrites.....						
Coal.....				8		10
Floor, soft slate						
Thickness of bed.....	2	9½	3	8½	2	5½
Thickness of sample.....	2	9½	3	8½	2	5½

Section *A* was cut from face of room 15 off 12 east entry, 3,000 feet from mouth of slope; section *B* was cut from face of room 4 off 15 east entry, 2,740 feet from mouth of slope; section *C* was cut from face of 7 east air course, 3,010 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into 4-, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 300 tons.

Hartshorne Coal Co. Mine, Hartshorne

Analysis 216, page 19. Bituminous coal, Hartshorne district, from Hartshorne Coal Co. No. 1 mine, a slope mine, 3 miles southeast of Hartshorne, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 6 inches. Average cover at points sampled, 200 feet. The bed was measured and sampled at two points by J. E. Moose and R. H. Brown, August 1, 1928, as described below:

Sections of coal bed in Hartshorne Coal Co. No. 1 mine

(Laboratory No. 216)

SECTION	A		B	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, rough sandstone				
Bony coal.....	1			
Mother coal.....				
Coal.....		7½	1	
Pyrites.....		½		½
Coal.....		7		5
Mother coal.....				
Coal.....	1	3		8½
Streak.....				
Coal.....			1	5
Floor, soft slate				
Thickness of bed.....	3	5½	3	6½
Thickness of sample.....	3	5½	3	6½

Section *A* was cut from face of 5 east entry, 1,200 feet from mouth of slope; section *B* was cut from face of 4 west entry, 900 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2-inch, and 1½-inch sizes on bar screens and picked on cars. The daily output at time of sampling was 120 tons.

Hailey-Ola Coal Co. Mine, Lutie

Analysis 217, page 20. Bituminous coal, Wilburton district, from Hailey-Ola No. 12 mine, a slope mine, 1½ miles east of Lutie, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 4 feet 8 inches to 5 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, August 2, 1928, as described below:

Sections of coal bed in Hailey-Ola No. 12 mine

(Laboratory No. 217)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....	11		7	
Mother coal.....				
Coal.....	1½		3½	
Streak.....				
Coal.....	2½		6	
Pyrites.....				
Coal.....	3½		11	
Streak.....				
Coal.....	1	10½	1	5
Streak.....				
Coal.....	1	7	1	½
Floor, hard slate				
Thickness of bed.....	5		4	9
Thickness of sample.....	5		4	9

Section *A* was cut from face of 5 west entry, 1,050 feet from mouth of slope; section *B* was cut from face of 5 east entry, 1,100 feet from mouth of slope.

System of mining, panel. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 600 tons.

Oak Ridge Coal Co. Mine, Red Oak

Analysis 218, page 20. Bituminous coal, Wilburton district, from J. B. Hilling No. 1 mine, a slope mine, 3½ miles southeast of Red Oak, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 2 feet 8 inches to 3 feet 1 inch. Average cover at points sampled, 275 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 2, 1928, as described below:

Sections of coal bed in J. B. Hilling No. 1 mine

(Laboratory No. 218)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, 18-inch bony coal				
Coal.....		4		5
Streak.....				
Coal.....	1	2		10
Mother coal.....				
Coal.....	1	4	1	8
Floor, shale				
Thickness of bed.....	2	10½	2	11
Thickness of sample.....	2	10½	2	11

Section *A* was cut from face of 6 feet entry, 1,050 feet from mouth of slope; section *B* was cut from face of room 10 off 6 west entry, 410 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump and mine run sizes on screens and picked on cars. The daily output at time of sampling was 300 tons.

LE FLORE COUNTY**Heavener Smokeless Coal Co. Mine, Heavener**

Analysis 219, page 22. Semibituminous coal, Howe-Poteau district, from Heavener Smokeless No. 1 mine, a slope mine, 1 mile north of Heavener, on the Kansas City Southern Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 6 inches to 3 feet 10 inches. Cover at points sampled, 180 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 3, 1928, as described below:

Sections of coal bed in Heavener Smokless No. 1 mine

(Laboratory No. 219)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and sandstone				
Coal.....	3½		3	
Pyrites.....				½
Coal.....	3		6½	
Streak.....				
Coal.....	6½		9	
Pyrites and middle band.....	4½		2	
Coal.....	4½		5	
Streak.....				
Coal.....	4		9	
Band.....	1			
Coal.....	9		8½	
Floor, shale				
Thickness of bed.....	3	10	3	7½
Thickness of sample.....	3	5	3	5½

Section *A* was cut from face of room 45 off 6 south entry, 2,850 feet from mouth of slope; section *B* was cut from face of room 45 off 6 north entry, 2,830 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 6-inch, and 2½-inch sizes on screens. The daily output at time of sampling was 250 tons.

Standard Coal Co. Mine, Howe

Analysis 220, page 22. Semibituminous coal, Howe-Poteau district, from Standard No. 5 mine, a shaft mine, 4 miles southeast of Howe, on the Kansas City Southern Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 9 inches. Average cover at points sampled, 150 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 3, 1928, as described below:

Sections of coal bed in Standard No. 5 mine

(Laboratory No. 220)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and sandstone				
Bony coal.....	10		8	
Coal.....	4	1	3	
Streak.....				¼
Coal.....	6		6	
Mother coal.....				
Coal.....	7		10	
Pyrites.....		½		¾
Coal.....	8½		7	
Streak.....				
Coal.....	1	6½		4
Floor, shale				
Thickness of bed.....	4	6½	4	2½
Thickness of sample.....	3	8½	3	6½

Dawes Brothers Coal Co. Mine, Howe

Analysis 221, page 22. Semibituminous coal, Hughes-Howe-Poteau district, from Dawes Brothers No. 4 mine, a slope mine, 2½ miles southeast of Howe, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 10 inches. Average cover at points sampled, 135 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 3, 1928, as described below:

Sections of coal bed in Dawes Brothers No. 4 mine

(Laboratory No. 221)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough sandstone				
Coal.....	10		10	
Pyrites.....				
Coal.....	2		3	
Streak.....				¼
Coal.....	1	2	9	
Pyrites and bony coal.....				4
Coal.....	1		2½	
Streak.....				
Coal.....	7		11	
Floor, slate and clay				
Thickness of bed.....	3	10	3	3½
Thickness of sample.....	3	10	2	11

Section *A* was cut from face of 4 east entry, 1,480 feet from mouth of slope; section *B* was cut from face of room 20 off 5 east entry, 1,600 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into mine run sizes on screens. The daily output at time of sampling was 125 tons.

Potter Smokeless Coal Co. Mine, Howe

Analysis 222, page 23. Semibituminous coal, Hughes-Howe-Poteau district, from Potter Smokeless No. 8 mine, a slope mine, 1¼ miles southwest of Howe, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet. Average cover at points sampled, 130 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 3, 1928, as described below:

Sections of coal bed in Potter Smokeless Coal No. 8 Mine

(Laboratory No. 222)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and sandstone				
Coal.....	7		6	
Streak.....				
Coal.....	3		7	
Pyrites.....		½		½
Coal.....	6½		5	
Pyrites.....		1		
Coal.....	7		6	
Pyrites and mother coal.....		½		½
Coal.....	4		9	
Pyrites.....		1		
Coal.....	7			
Floor, clay				
Thickness of bed.....	2	11½	2	9½
Thickness of sample.....	2	11½	2	9½

Section *A* was cut from face of 4 west entry, 1,610 feet from mouth of slope; section *B* was cut from face of 4 east entry, 1,800 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into 6-inch and 2½-inch sizes on bar screens. The daily output at time of sampling was 150 tons.

Security Coal Co. Mine, Poteau

Analysis 223, page 23. Semibituminous coal, Howe-Poteau district, from Poteau Machine Co. No. 1 mine, a slope mine, 2½ miles northeast of Poteau, a wagon mine. Coal bed, Cavanal seam; thickness of bed, 2 feet 1 inch to 2 feet 4 inches. Average cover at points sampled, 80 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 4, 1928, as described below:

Sections of coal bed in Poteau Machine Co. No. 1 mine

(Laboratory No. 223)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and 3-inch bony coal				
Coal.....		3		4
Pyrites.....				
Coal.....	1	3½	1	3
Streak, bony and pyrites.....				½
Coal.....		6		3
Floor, fine clay				
Thickness of bed.....	2	1	1	10½
Thickness of sample.....	2	1	1	10½

Section *A* was cut from face of long wall off 1 south entry, 700 feet from mouth of slope; section *B* was cut from face of long wall off 2 south entry, 750 feet from mouth of slope.

System of mining, long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes. The daily output at time of sampling was 50 tons.

Poteau Pure Vein Coal Co. Mine, Poteau

Analysis 224, page 24. Semibituminous coal, Howe-Poteau district, from Pure Vein No. 1 mine, a slope mine, 1½ miles northwest of Poteau, a wagon mine. Coal bed, Cavanal; thickness of bed, 1 foot 10 inches to 2 feet. Average cover at points sampled, 170 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 4, 1928, as described below:

Sections of coal bed in Pure Vein No. 1 mine

(Laboratory No. 224)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....	9		7	
Pyrites.....	5 $\frac{1}{2}$	1	3 $\frac{1}{2}$	
Coal.....	10 $\frac{1}{2}$			
Pyrites.....				
Coal.....				
Floor, clay				
Thickness of bed.....	2	10 $\frac{1}{2}$	1	10 $\frac{1}{2}$
Thickness of sample.....	2	10 $\frac{1}{2}$	1	10 $\frac{1}{2}$

Section *A* was cut from face of 4 south entry, 800 feet from mouth of slope; section *B* was cut from face of long wall off 4 north entry, 840 feet from mouth of slope.

System of mining, long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes. The daily output at time of sampling was 100 tons.

Mongolian Coal Co. Mine, Poteau

Analysis 225, page 24. Semibituminous coal, Howe-Poteau district, from Mongolian No. 1 mine, a slope mine, 1 $\frac{1}{4}$ miles west of Poteau, on the Frisco Railroad. Coal bed, Cavanal; thickness of bed, 1 foot, 10 inches. Average cover at points sampled, 95 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 4, 1928, as described below:

Sections of coal bed in Mongolian No. 1 mine

(Laboratory No. 225)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....		1 $\frac{1}{2}$		2
Pyrites.....				
Coal.....		3 $\frac{1}{2}$		4
Pyrites.....				
Coal.....	1	1 $\frac{1}{2}$	1	1 $\frac{1}{2}$
Mother coal.....				
Coal.....		3		3
Floor, clay				
Thickness of bed.....	1	9 $\frac{1}{2}$	1	10 $\frac{1}{2}$
Thickness of sample.....	1	9 $\frac{1}{2}$	1	10 $\frac{1}{2}$

Section *A* was cut from face of 1 south entry, 400 feet from mouth of slope; section *B* was cut from face of main slope, 310 feet from mouth of slope.

System of mining, long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and stock sizes. The daily output at time of sampling was 60 tons.

Poteau Coal Corporation Mine, Poteau

Analysis 226, page 24. Semibituminous coal, Howe-Poteau district, from Poteau Coal Corporation No. 1 mine, a slope mine, 1 $\frac{1}{4}$ miles southwest of Poteau, on the Frisco Railroad. Coal bed, Cavanal; thickness of bed, 2 feet. Average cover at points sampled, 180 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 4, 1928, as described below:

Sections of coal bed in Poteau Coal Corporation No. 1 mine

(Laboratory No. 226)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough shale				
Coal.....	7		3	
Pyrites.....		$\frac{1}{8}$		
Coal.....	8		6	
Mother coal.....		$\frac{1}{2}$		$\frac{1}{2}$
Coal.....	7		1	$2\frac{1}{2}$
Floor, clay				
Thickness of bed.....	1	$10\frac{5}{8}$	2	0
Thickness of sample.....	1	$10\frac{5}{8}$	2	0

Section *A* was cut from face of 6 north entry, 1,480 feet from mouth of slope; section *B* was cut from face of 6 south entry, 1,470 feet from mouth of slope.

System of mining, long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and slack sizes. The daily output at time of sampling was 150 tons.

Oakland Coal Co. Mine, Poteau

Analysis 227, page 24. Semibituminous coal, Howe-Poteau district, from Oakland No. 1 mine, a slope mine, $3\frac{1}{2}$ miles southwest of Poteau, on the Frisco Railroad. Coal bed, *Cavanal*; thickness of bed, 2 feet 1 inch. Average cover at points sampled, 325 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 4, 1928, as described below:

Sections of coal bed in Oakland No. 1 mine

(Laboratory No. 227)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....		$6\frac{1}{2}$		$3\frac{1}{2}$
Pyrites.....				$\frac{1}{2}$
Coal.....	1	3		4
Mother Coal.....				
Coal.....		4	1	$5\frac{1}{2}$
Floor, clay				
Thickness of bed.....	2	$1\frac{1}{2}$	2	1
Thickness of sample.....	2	$1\frac{1}{2}$	2	1

Section *A* was cut from face of 3 left entry, 750 feet from mouth of slope; section *B* was cut from face of 4 right entry, 685 feet from mouth of slope.

System of mining, long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and slack sizes on bar screens. The daily output at time of sampling was 100 tons.

Potter Smokeless Coal Co. Mine, Howe

Analysis 230, page 22. Semibituminous coal, Hughes-Howe-Poteau district, from Potter Smokeless No. 7 mine, a slope mine, $2\frac{1}{2}$ miles southwest of Howe, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower *Hartshorne*; thickness of bed, 3 feet to 3 feet 6 inches. Average cover at points sampled, 105 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 8, 1928, as described below:

Sections of coal bed in Potter Smokeless No. 7 mine

(Laboratory No. 230)

SECTION	A		B	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, slate and sandstone				
Coal.....	1	0	1	3
Pyrites.....				1
Coal.....		4		8
Mother coal.....				
Coal.....		5		9
Streak.....				
Coal.....		5		4
Mother coal.....		1		
Coal.....	1	3		
Floor, clay				
Thickness of bed.....	3	6	3	1
Thickness of sample.....	3	6	3	1

Section *A* was cut from face of 2 east entry, 1,350 feet from mouth of slope; section *B* was cut from face of 3 west entry, 1,310 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into 6-inch and 2½-inch sizes on bar screens. The daily output at time of sampling was 160 tons.

Covington Coal Co. Mine, Tahona

Analysis 231, page 25. Semibituminous coal, McCurtain-Bokoshe-Panama district, from Covington mine, a slope mine, 1 mile southwest of Tahona, on the Midland Valley Railroad. Coal bed, lower Hartshorne; thickness of bed, 4 feet 9 inches to 5 feet 2 inches. Average cover at points sampled, 180 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 8, 1928, as described below:

Sections of coal bed in Covington Slope No. 7 mine

(Laboratory No. 231)

SECTION	A		B	
	<i>Fl.</i>	<i>in.</i>	<i>Fl.</i>	<i>in.</i>
Roof, slate				
Coal.....		1		6
Streak.....				
Coal.....	1	1	1	5
Mother coal.....				
Coal.....		11		8
Pyrites.....				
Coal.....	1	0	1	
Pyrites.....				
Coal.....	1	6	1	
Floor, slate				
Thickness of bed.....	4	9	5	2
Thickness of sample.....	4	9	5	2

Section *A* was cut from face of room 45, 910 feet from mouth of slope; section *B* was cut from face of room 47, 970 feet from mouth of slope.

System of mining, panel. Coal undercut by machine and shot down with cardox (CO₂). Coal was separated into lump, 2¼-, and 1¼-inch sizes on round hole screens. The daily output at time of sampling was 1,000 tons.

Acme Semianthracite Coal Co. Mine, Williams

Analysis 232, page 25. Semibituminous coal, McCurtain-Bokoshe-Panama district, from Semianthracite Mine, a slope mine, 2 miles west of Williams, on the Midland Valley Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 8 inches to 4 feet 6 inches. Average cover at points sampled, 240 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 8, 1928, as described below:

Sections of coal bed in Acme Semianthracite mine

(Laboratory No. 232)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal		5½		4½
Mother coal				
Coal		7½		10½
Streak				
Coal		11		8
Pyrites				
Coal		6		10
Streak				
Coal		5½	1	4
Rock				
Coal	1	6		
Floor, sandstone				
Thickness of bed	4	6½	4	1
Thickness of sample	4	5½	4	1

Section *A* was cut from face of room 4 off 2 east entry, 1,510 feet from mouth of slope; section *B* was cut from face of 3 west entry, 1,365 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2¼-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 120 tons.

Superior Smokeless Coal and Mining Co. Mine, Tahona

Analysis 233, page 25. Semibituminous coal, McCurtain-Bokoshe-Panama district, from Superior Smokeless No. 29 mine, a slope mine, ¾ mile south of Tahona, on the Midland Valley Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet, 9 inches. Cover at points sampled; *A*, 405 feet; *B*, 385 feet; and *C*, 385 feet. The bed was measured and sampled at three points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 9, 1928, as described below:

Sections of coal bed in Superior Smokeless No. 29 mine

(Laboratory No. 233)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, draw slate and sandstone						
Coal		8½		5½		5
Mother coal						
Coal		8½		5		5½
Pyrites						
Coal	1	3		10½	1	2
Rock		1		½		½
Coal		3½		6½		9½
Pyrites						
Coal		9½	1	5		10
Floor, clay						
Thickness of bed	3	9½	3	9½	3	7½
Thickness of sample	3	8½	3	8½	3	7

Section *A* was cut from face of room 14 off 9 west entry, 3,864 feet from mouth of slope; section *B* was cut from face of room 24 off 8 east entry, 3,960 feet from mouth of slope; section *C* was cut from face of room 35 off 8 west entry, 5,100 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 630 tons.

White Oak Coal Co. Mine, Panama

Analysis 234, page 23. Semibituminous coal, McCurtain-Bokoshe-Panama district, from White Oak No. 1 mine, a slope mine, 3 miles west of Panama, on the Midland Valley Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet to 3 feet 4 inches. Cover at points sampled; *A*, 150 feet; *B*, 210 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 10, 1928, as described below:

Sections of coal bed in White Oak No. 1 mine

(Laboratory No. 234)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal		5½		6
Mother coal				
Coal		7		10½
Pyrites				
Coal		8½		9
Streak				
Coal		8½		3
Slate		2		3
Coal		9		8½
Floor, sandstone				
Thickness of bed	3	4½	3	4
Thickness of sample	3	2½	3	1

Section *A* was cut from face of room 15 off 4 west entry, 1,705 feet from mouth of slope; section *B* was cut from face of room 12 off 5 east entry, 1,900 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 6-inch and 2-inch sizes on shaker screens and picked into cars. The daily output at time of sampling was 250 tons.

Panama Smokeless Coal Co. Mine, Panama

Analysis 235, page 23. Semibituminous coal, McCurtain-Bokoshe-Panama district, from Panama Smokeless No. 1 mine, a slope mine, 2 miles west of Panama, on the Midland Valley Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 6 inches. Average cover at points sampled, 150 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 10, 1928, as described below:

Sections of coal bed in Panama Smokeless No. 1 mine

(Laboratory No. 235)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal		6½		6
Mother coal				
Coal		7		10
Rock and pyrite		5		½
Coal		11½		8
Pyrite				
Coal		8½		9½
Streak				
Coal				6½
Floor, slate				
Thickness of bed	3	3½	3	5½
Thickness of sample	2	10½	3	5

Section *A* was cut from face of room 1 off 1 east entry, 1,190 feet from mouth of slope; section *B* was cut from face of room 3 off 1 west entry, 1,010 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes on bar screens. The daily output was 100 tons.

Bokoshe Smokeless Coal Co. Mine, Bokoshe

Analysis 236, page 21. Semibituminous coal, McCurtain-Massey district, from Rees Smokeless No. 8 mine, a slope mine, ½ mile north of Bokoshe, on the Midland Valley and Ft. Smith & Western Railroads. Coal beds, lower Hartshorne; thickness of bed, 6 feet to 6 feet 3 inches. Cover at points sampled; *A*, 220 feet; *B*, 240 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 10, 1928, as described below:

Sections of coal bed in Rees Smokeless No. 8 mine

(Laboratory No. 236)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....		3½		4½
Pyrites.....				
Coal.....	1	½		5
Rock.....				
Coal.....		7½	1	3½
Rock and slate.....	1	11	1	10
Coal.....		8½		3½
Pyrites.....				
Coal.....		8½		10½
Pyrites.....				
Coal.....		8	1	3
Floor, slate				
Thickness of bed.....	5	11½	6	4½
Thickness of sample.....	4	¾	4	7½

Section *A* was cut from face of main slope, 2,050 feet from mouth of slope; section *B* was cut from face of room 8 off 7 north, 1,610 feet from mouth of slope.

System of mining, room and pillar and panel. Coal undercut by hand and machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes on shaker screen and picked on cars. The daily output at time of sampling was 200 tons.

Bokoshe Smokeless Coal Co. Mine, Bokoshe

Analysis 237, page 21. Semibituminous coal, McCurtain-Massey district, from Grayston Brothers mine, a slope mine, ¾ mile northeast of Bokoshe, on the Midland Valley and Ft. Smith & Western Railroads. Coal bed, lower Hartshorne; thickness of bed, 4 feet 3 inches to 4 feet 9 inches. Cover at point sampled: *A*, 200 feet; *B*, 215 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 10, 1928, as described below:

Sections of coal bed in Grayston Brothers mine

(Laboratory No. 237)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....		5½	1	
Pyrites.....				
Coal.....		8½		7½
Pyrites.....				
Coal.....		10½		6½
Rock.....		2		1
Coal.....	1	1		7½
Pyrites.....				
Coal.....		9		9
Streak.....				
Coal.....		10½		9½
Floor, slate				
Thickness of bed.....	4	11½	4	5
Thickness of sample.....	4	9½	4	4

Section *A* was cut from face at bottom of main slope, 850 feet from mouth; section *B* was cut from face of room 4 off 3 south entry, 1,250 feet from mouth.

System of mining, room and pillar and panel. Coal undercut by hand and machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes on shaker screens and picked on cars. The daily output at time of sampling was 100 tons.

I. X. L. Coal Co. Mine, Bokoshe

Analysis 238, page 21. Semibituminous coal, McCurtain-Massey district, from I. X. L. No. 7 mine, a slope mine, 3½ miles northeast of Bokoshe, on the Ft. Smith & Western Railroad. Coal bed, lower Hartshorne; thickness of bed, 4 feet to 5 feet 6 inches. Cover at points sampled: *A*, 105 feet; *B*, 160 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 11, 1928 as described below:

Sections of coal bed in I. X. L. No. 7 mine

(Laboratory No. 238)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....	3		4	1
Streak.....				
Coal.....	7		10	
Pyrites and rock.....				2
Coal.....	4		4	1
Streak.....				
Coal.....	1	4	11	
Streak.....				
Coal.....		8		9
Pyrites.....				
Coal.....	1	3		8
Coal.....		10		
Floor, slate				
Thickness of bed.....	5	6	4	11
Thickness of sample.....	5	6	3	11

Section *A* was cut from face of room 3 off 2 east entry, 505 feet from mouth of slope; section *B* was cut from face of room 2 off 3 west entry, 700 feet from mouth of slope.

System of mining, panel. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2-inch, and slack sizes on bar screens. The daily output at time of sampling was 120 tons.

Peerless Smokeless Coal Co. Mine, Bokoshe

Analysis 239, page 21. Semibituminous coal, McCurtain-Massey district, from W. S. Simpson No. 4 mine, a slope mine, 3 miles northeast of Bokoshe, on the Ft. Smith & Western Railroad. Coal bed, lower Hartshorne; thickness of bed, 4 feet 3 inches to 4 feet 6 inches. Cover at points sampled: *A*, 300 feet; *B*, 170 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 11, 1928, as described below:

Sections of coal bed in W. S. Simpson No. 4 mine

(Laboratory No. 239)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....		4		8
Pyrites.....				
Coal.....		4		4
Mother coal.....				
Coal.....		6		6
Pyrites.....				
Coal.....		9		10
Rock.....		3		4
Coal.....		10		6
Streak.....				
Coal.....	1	6	1	
Floor, slate				
Thickness of bed.....	4	8	4	3
Thickness of sample.....	4	5	3	10

Section *A* was cut from face of 3 east entry, 774 feet from mouth of slope; section *B* was cut from face of 1 west entry 405 feet from mouth of slope.

System of mining, panel. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes on bar screens. The daily output at time of sampling was 100 tons.

Premier Coal Co. Mine, Milton

Analysis 240, page 23. Semibituminous coal, McCurtain-Massey district, from Hunter and Goodwin No. 2 mine, as slope mine. 1 mile west of Milton, on the Ft. Smith & Western Railroad. Coal bed, lower Hartshorne; thickness of bed, 2 feet 8 inches to 3 feet. Cover at points sampled: *A*, 100 feet; *B*, 140 feet. The bed was measured and sampled at two points by J. E. Moose, W. C. Robbins, and R. H. Brown, August 11, 1928, as described below:

Section of coal bed in Hunter and Goodwin No. 2 mine

(Laboratory No. 240)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, 2 feet coal				
Coal.....	5		6	
Pyrites.....				
Coal.....	6		6½	
Streak.....				
Coal.....	6		5½	
Mother coal.....				
Coal.....	9½		10	
Streak.....				
Coal.....	9		10½	
Floor, rock				
Thickness of bed.....	3	¼	3	2½
Thickness of sample.....	3	¼	3	2½

Section *A* was cut from face of room 5 off east panel, 305 feet from mouth of slope; section *B* was cut from face of 2 east entry, 450 feet from mouth of slope.

System of mining, panel. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes on bar screens. The daily output at time of sampling was 80 tons.

MAYES COUNTY**Chelsea Coal Co. Mine, Chelsea**

Analysis 178, page 25. Bituminous coal, northeastern Oklahoma district, from Chelsea Coal Co. strip pit, a wagon mine, 2½ miles south of Chelsea. Coal bed, Cherokee; thickness, 1 foot 7 inches. Cover at point sampled, 18 feet. Sampled in two places. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, July 10, 1928, as described below:

Sections of coal bed in Chelsea Coal Co. strip pit

(Laboratory No. 178)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale 8 ft., clay 10 ft.				
Coal.....	1	7	1	7½
Thickness of bed.....	1	7	1	7½

System of mining, stripped with steam shovel. Coal wedged and barred from solid and loaded by hand and shovel. Average daily output, 250 tons, all from advance workings.

French and York Mine, Chelsea

Analysis 179, page 26. Bituminous coal, northeastern Oklahoma district, from French and York strip pit, wagon mine 2¼ miles south of Chelsea. Coal bed, Cherokee; thickness 1 foot 7 inches. Cover at point sampled, 12 feet. Sampled in two places 100 yards apart in west part of pit. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, July 10, 1928, as described below:

Sections of coal bed in French and York strip pit

(Laboratory No. 179)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale, 5 feet, to clay 7 feet				
Coal.....	1	7	1	6
Thickness of bed.....	1	7	1	6

System of mining, stripped with steam shovel. Coal shot with black powder and loaded by hand and shovel. Average daily output 75 tons, all from advance working.

MUSKOGEE COUNTY

Trojan Coal Co. Mine, Porum

Analysis 171, page 26. Bituminous coal, Stigler-Tamaha district, from Trojan Coal Co. mine, a strip pit, 6 miles northeast of Porum, on the Midland Valley Railroad. Coal bed, Stigler; thickness of bed, 1 foot 10 inches. Cover at points sampled, 18 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, July 5, 1928, as described below:

Sections of coal bed in Trojan Coal Co. strip pit

(Laboratory No. 171)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale 6 ft., clay 12 ft.				
Bony coal.....		4		3½
Coal.....	1	6	1	6
Floor, shale				
Thickness of bed.....	1	10	1	9½
Thickness of sample.....	1	6	1	6

Section *A* was cut from face at middle of pit; section *B* was cut from face at point 300 yards east of middle of pit.

Cover stripped with steam shovel and coal shot from solid with black powder, and loaded with crane and pan. Coal was separated into mine run sizes by hand and crowbar. The daily output at time of sampling was 400 tons.

OKMULGEE COUNTY

Star Coal Mining Co. Mine, Henryetta

Analysis 154, page 29. Bituminous coal, Henryetta district, from Star No. 2 mine, a shaft mine 4½ miles northeast of Henryetta, on the Frisco Railroad. Coal bed, Henryetta, (Senora formation); thickness of bed, 2 feet 10 inches to 3 feet. Cover at points sampled: *A*, 130 feet; *B*, 130 feet; and *C*, 130 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 14, 1928, as described below:

Section of coal bed in Star No. 2 mine

(Laboratory No. 154)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal.....	1	2	1	4	1	4½
Mother coal and dirt.....		2		2½		1
Coal.....	1	7½	1	7	1	6½
Floor, hard shale						
Thickness of bed.....	2	11½	3	11½	3	0
Thickness of sample.....	2	9½	2	11	2	11

Section *A* was cut from face of 1 south back entry, 1,200 feet from mouth of shaft; section *B* was cut from face of 3 north entry, 1,250 feet from mouth of shaft; section *C* was cut from face at main east entry.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 6-, 2½-, and 1¼-inch sizes on shaker screens. The average daily output was 600 tons. Estimated life of mine, 25 years.

Atlas Coal Co. Mine, Henryetta

Analysis 155, page 29. Bituminous coal, Henryetta district, from Atlas Coal Co. No. 1 mine, a drift mine, 2 miles northeast of Henryetta, on the Frisco Railroad. Coal bed Henryetta (Senora formation); thickness of bed, 2 feet 11 inches to 3 feet 1 inch. Average cover at points sampled, 152 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 15th, 1928, as described below:

Sections of coal bed in Atlas mine

(Laboratory No. 155)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal	1	4½	3	1	1	2
Mother coal						
Coal	1	6½			1	7½
Floor, hard shale						
Thickness of bed	2	11	3	1	2	9½
Thickness of sample	2	10½	3	1	2	9

Section *A* was cut from face of room 6 off main west entry, 4,400 feet from mouth of mine; section *B* was cut from face of room 6 off 4 east entry, 4,500 feet from mouth of mine; and section *C* was cut from face of room 8 off 1 north entry, 2,550 feet from mouth of mine.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens. The average daily output at time of sampling was 750 tons.

Acme Coal and Mining Co. Mine, Schulter

Analysis 156, page 30. Bituminous coal, Henryetta district, from B. and A. No. 2 mine, a shaft mine, ¾ mile west of Schulter, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 3 feet 2 inches. Cover at points sampled, 115 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 16, 1928, as described below:

Sections of coal bed in B. and A. No. 2 mine

(Laboratory No. 156)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal	3	2	3	1	3	2½
Floor, hard slate						
Thickness of bed	3	2	3	1	3	2½
Thickness of sample	3	2	3	1	3	2½

Section *A* was cut from face of room 1 in south entry off west (?), 1,700 feet from shaft bottom; section *B* was cut from face of main west entry, across from air course, 1,750 feet from shaft bottom; section *C* was cut from face of room 5 on 6 north off main west entry, 1,400 feet from shaft bottom.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 525 tons.

Ben Hur Coal Co. Mine, Henryetta

Analysis 157, page 28. Bituminous coal, Henryetta district, from Sun No. 1 mine, a slope mine, 5 miles northeast of Henryetta, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 3 feet 2 inches. Average cover at points sampled, 125 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 18, 1928, as described below:

Sections of coal bed in Sun No. 1 Mine

(Laboratory No. 157)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandstone and shale						
Bash.....		4		3		4½
Bone.....		¾		1	
Coal.....	3	2½	3	0	1	11
Mother coal.....						½
Coal.....						10
Floor, hard rough shale						
Thickness of bed.....	3	6½	3	4	3	1½
Thickness of sample.....	3	2½	3	0	2	9

Section *A* was cut from face of room 39 off main entry, northeast, 4,050 feet from slope mouth; section *B* was cut from face of room 50 off 1 east of southeast entry, 4,200 feet from slope mouth; section *C* was cut from face of room 25 off 1 south entry, 2,750 feet from slope mouth.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 300 tons.

Hughes Fuel Co. Mine, Dewar

Analysis 158, page 26. Bituminous coal, Henryetta district, from Wadsworth No. 1 mine, a drift mine, 1½ miles northeast of Dewar, on the Kansas, Oklahoma, and Gulf Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 2 feet 8 inches. Average cover at points sampled, 180 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, June 18, 1928, as described below:

Sections of coal bed in Wadsworth No. 1 mine

(Laboratory No. 158)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....	1	3		11
Mother coal.....		4½		4
Coal.....	1	2	1	5
Floor, hard shale				
Thickness of bed.....	2	9½	2	8
Thickness of sample.....	2	5	2	4

Section *A* was cut from face of 5 east entry, 1,200 feet from mine mouth; section *B* was cut from face of room 1 off 8 east 30 west entry, 1,775 feet from mine mouth.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 170 tons.

Wise-Buchanan Coal Co. Mine, Henryetta

Analysis 159, page 26. Bituminous coal, Henryetta district, from Wise-Buchanan No. 1 mine, a shaft mine, 1½ miles southwest of Henryetta, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 2 feet 9 inches to 3 feet. Average cover at points sampled, 235 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 19, 1928, as described below:

Sections of coal bed in Wise-Buchanan No. 1 mine

(Laboratory No. 159)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal.....	1	3	1	5	1	5
Rock band.....		5½		2		1
Coal.....	1	3½	1	1	1	3
Floor, hard shale						
Thickness of bed.....	3	0	2	8	2	9
Thickness of sample.....	2	6½	2	6	2	8

Section *A* was cut from face of room 17 off 7 south off main east entry, 2,450 feet from shaft; section *B* was cut from face of main west entry, 1,450 feet from bottom of shaft; section *C* was cut from face on rib of 1 north off main east entry, 1,900 feet from shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 4½-, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 850 tons.

Pittsburg-Midway Coal & Mining Co. Mine, Henryetta

Analysis 160, page 27. Bituminous coal, Henryetta district, from Pittsburg-Midway No. 12 mine, a shaft mine, ½ mile east of Henryetta on the Kansas, Oklahoma & Gulf Railroad. Coal bed, Henryetta, (Senora formation); thickness of bed, 2 feet 10 inches to 3 feet. Average cover at points sampled, 180 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 19, 1928, as described below:

Sections of coal bed in Pittsburg-Midway No. 12 mine

(Laboratory No. 160)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal.....	1	2	1	4	1	4
Rock band.....		3		4		4
Coal.....	1	5	1	2	1	4
Floor, hard shale						
Thickness of bed.....	2	10	2	10	3	0
Thickness of sample.....	2	7	2	6	2	8

Section *A* was cut from face of room 4 off 8 south entry, 2,800 feet from bottom of shaft; section *B* was cut from face of room 16 off main east entry, 2,600 feet from bottom of shaft; section *C* was cut from face of room 38 off 6 south entry, 2,850 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 350 tons.

Missing Link Coal Co. Mine, Henryetta

Analysis 161, page 27. Bituminous coal, Henryetta district, from Kincaide No. 1 mine, a slope mine, 5½ miles northeast of Henryetta on the Kansas, Oklahoma & Gulf Railroad. Coal bed, Henryetta, (Senora formation); thickness of bed, 2 feet, 9 inches. Average cover at points sampled, 135 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, June 20, 1928, as described below:

Sections of coal bed in Kincaide No. 1 mine

(Laboratory No. 161)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, sandstone				
Bony coal.....		3½		2
Coal.....	2	8	2	9
Floor, hard shale				
Thickness of bed.....	2	11½	2	11
Thickness of sample.....	2	8	2	9

Section *A* was cut from face of 1 west off main south entry, 2,550 feet from mouth of slope; section *B* was cut from face of room 2 off 1 east off main entry, 2,250 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 125 tons.

Hillside Coal Co. Mine, Henryetta

Analysis 162, page 27. Bituminous coal, Henryetta district, from Kincaide No. 2 mine, a shaft mine, 5 miles northeast of Henryetta, on the Kansas, Oklahoma & Gulf Railroad. Coal bed, Henryetta, (Senora formation); thickness of bed, 2 feet 10 inches. Average cover at points sampled, 140 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, June 20, 1928, as described below:

Sections of coal bed in Kincaide No. 2 mine

(Laboratory No. 162)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, sandstone and slate				
Rash.....	1	10½	1	11
Coal.....	2	10	1	1½
Rock and dirt band.....				1¼
Coal.....			1	8
Floor, shale				
Thickness of bed.....	3	10½	3	9½
Thickness of sample.....	2	10	2	9½

Section *A* was cut from face of main west entry, 1,000 feet from shaft bottom; section *B* was cut from face of 5 south entry, 975 feet from shaft bottom.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and 1½-inch sizes on grizzly screens. The daily output at time of sampling was 65 tons.

McGennis Coal Co. Mine, Henryetta

Analysis 163, page 27. Bituminous coal, Henryetta district, from McGennis No. 1 mine, a shaft mine, 1½ miles east of Henryetta, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 2 feet 9½ inches. Average cover at points sampled, 125 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 21, 1928, as described below:

Sections of coal bed in McGennis No. 1 mine

(Laboratory No. 163)

SECTION	A		B		C	
	Fl.	in.	Fl.	in.	Fl.	in.
Roof, slate						
Coal.....	1	2	1	2	1	4
Rock.....		4½		5		4½
Coal.....	1	3	1	2½	1	1½
Floor, shale						
Thickness of bed.....	2	9½	2	9½	2	10
Thickness of sample.....	2	5	2	4½	2	5½

Section *A* was cut from face of main west entry, 1,500 feet from bottom of shaft; section *B* was cut from face of room 7 off 5 south entry, 1,250 feet from bottom of shaft; section *C* was cut from face of room 8 off 5 north entry, 1,275 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 150 tons.

Warden-Pullen Coal Co. Mine, Henryetta

Analysis 164, page 28. Bituminous coal, Henryetta district, from Warden-Pullen No. 2 mine, a shaft mine, 1½ miles northeast of Henryetta, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 3 feet. Average cover at points sampled, 250 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, June 21, 1928, as described below:

Sections of coal bed in Warden-Pullen No. 2 mine

(Laboratory No. 164)

SECTION	A		B		C	
	Fl.	in.	Fl.	in.	Fl.	in.
Roof, slate						
Coal.....	2	10	2	8½	3	4½
Floor, shale						
Thickness of bed.....	2	10	2	8½	3	4½
Thickness of sample.....	2	10	2	8½	3	4½

Section *A* was cut from face of room 70 off 1 north entry, 2,200 feet from bottom of shaft; section *B* was cut from face of 1 west entry, 30 feet from 4th north, 2,500 feet from bottom of shaft; section *C* was cut from face of room 14 off 3 south main, 1,900 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, 1¼-inch sizes on shaker screens and picked on ears. The average daily output was 500 tons.

Cotton Coal Co. Mine, Henryetta

Analysis 165, page 28. Bituminous coal, Henryetta district, from Red Herron No. 1 mine, a slope mine, 7 miles northeast of Henryetta, on the Kansas, Oklahoma & Gulf Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 3 feet. Average cover at points sampled, 165 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, June 22, 1928, as described below:

Sections of coal bed in Red Herron No. 1 mine

(Laboratory No. 165)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough sandstone				
Rash.....		6		4
Coal.....	2	6	2	10½
Floor, shale				
Thickness of bed.....	3	0	3	2½
Thickness of sample.....	2	6	2	10½

Section *A* was cut from face of room 10 off 11 north back entry, 3,900 feet from mouth of slope; section *B* was cut from face of main west back entry, 4,100 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on screens and picked on ears. The average daily output at time of sampling was 170 tons.

Elite Coal Co. Mine, Henryetta

Analysis 166, page 28. Bituminous coal, Henryetta district, from Gem No. 1 mine, a shaft mine, 1½ miles northeast of Henryetta, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 3 feet. Average cover at points sampled, 84 feet. The bed was measured at one point by J. E. Moose and W. R. Rutherford, June 22, 1928, as described below:

Section of coal bed in Gem No. 1 mine^{9a}

(Laboratory No. 166)

SECTION	A	
	<i>Ft.</i>	<i>in.</i>
Roof, slate		
Rash.....		2
Coal.....	1	2½
Rock.....		4
Coal.....	1	7
Floor, shale		
Thickness of bed.....	3	3½
Thickness of sample.....	2	11½

Section *A* was cut from face of room 4 off main north entry, 2,500 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on grizzly screens. The daily output at time of sampling was 120 tons.

Gaither Coal Co. Mine, Okmulgee

Analysis 167, page 29. Bituminous coal, Okmulgee-Henryetta district, from Gaither No. 1 mine, a slope mine, 4½ miles southeast of Okmulgee, on the Frisco Railroad. Coal bed, Henryetta (Senora formation); thickness of bed, 2 feet. Average cover at points sampled, 70 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, June 23, 1928, as described below:

^{9a}. This mine sampled at only one point due to rock fall in only other available entry.

Sections of coal bed in Gaither No. 1 mine

(Laboratory No. 167)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....	3			3½
Bony band.....		1		3¼
Coal.....		6½		7
Bony band.....		2½		1
Coal.....		4½	1	3
Dirt band.....				---
Coal.....		6		---
Floor, soft shale.....				---
Thickness of bed.....	2	0	2	5½
Thickness of sample.....	1	8½	2	1½

Section *A* was cut from face of 1 south entry, 850 feet from mouth of slope; section *B* was cut from face of main southwest entry, 700 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. The daily output at time of sampling was 50 tons.

PITTSBURG COUNTY

Southern Fuel Co. Mine, Savanna

Analysis 185, page 35. Bituminous coal, McAlester district, from Southern No. 4 mine, a slope mine, 4 miles southeast of Savanna, on the Missouri, Kansas & Texas Railroad. Coal bed, McAlester; thickness of bed, 3 feet 7 inches. Average cover at points sampled, 750 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 16, 1928, as described below:

Sections of coal bed in Southern No. 4 mine

(Laboratory No. 185)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....	3	6	3	7
Floor, hard shale				
Thickness of bed.....	3	6	3	7
Thickness of sample.....	3	6	3	7

Section *A* was cut from face of 13 north entry, 2,175 feet from mouth of slope. Section *B* was cut from face at 13 south entry, 2,200 feet from mouth of slope.

System of mining, room and pillar. Coal shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 350 tons.

Mullen Coal Co. Mine, McAlester

Analysis 186, page 34. Bituminous coal, McAlester district, from Julien No. 1 mine, a slope mine, 3 miles west of McAlester, on the Missouri, Kansas, & Texas Railroad. Coal bed, McAlester; thickness of bed, 3 feet 4 inches. Average cover at points sampled, 450 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 17, 1928, as described below:

Sections of coal bed in Julien No. 1 mine

(Laboratory No. 186)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate and 5½ in. rash				
Coal.....		5		5½
Streak.....				---
Coal.....		3½		3
Streak.....				---
Coal.....		5		4½
Pyrites.....				½
Coal.....		8½		11½
Pyrites.....				½
Coal.....		4		6
Streak.....		½		½
Coal.....	1	1		7
Floor, shale				
Thickness of bed.....	3	3½	3	1½
Thickness of sample.....	3	2½	3	1½

Section *A* was cut from face at 120 west main slope, 1,000 feet from mouth; section *B* was cut from face at 6 west entry, 400 feet from main slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 125 tons.

Old Town Coal Co. Mine, North McAlester

Analysis 187, page 34. Bituminous coal, McAlester district, from Old Town Coal Co. mine, a slope mine, $\frac{1}{4}$ mile west of North McAlester, on the Missouri, Kansas & Texas Railroad. Coal bed, McAlester; thickness of bed, 3 feet 7 inches. Cover at points sampled, 950 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 17, 1928, as described below:

Sections of coal bed in Old Town Coal Co. mine

(Laboratory No. 187)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate and 5 inch rash				
Coal.....		6		6
Pyrites.....				
Coal.....		4		5
Pyrites.....				
Coal.....		9 $\frac{1}{2}$		9 $\frac{1}{4}$
Pyrites.....				
Coal.....		10		10 $\frac{1}{2}$
Streak.....				
Coal.....	1	0	1	1
Floor, shale				
Thickness of bed.....	3	5 $\frac{3}{4}$	3	7 $\frac{3}{4}$
Thickness of sample.....	3	5 $\frac{3}{4}$	3	7 $\frac{3}{4}$

Section *A* was cut from face of 7 west entry, 5,000 feet from mouth of slope; section *B* was cut from face at 7 east entry, 100 feet off slope and 5,050 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2 $\frac{1}{2}$ -, and 1 $\frac{1}{4}$ -inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 150 tons.

McAlester Edwards Coal Co. Mine, Pittsburg

Analysis 188, page 35. Bituminous coal, McAlester district, from McAlester Edwards No. 3 mine, a slope mine, 3 miles west of Pittsburg, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed, 3 feet 6 inches. Average cover at points sampled, 800 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 18, 1928, as described below:

Sections of coal bed in McAlester Edwards No. 3 mine

(Laboratory No. 188)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, rough slate				
Coal.....		10 $\frac{1}{2}$		4 $\frac{1}{4}$
Pyrites.....				
Coal.....		7 $\frac{1}{4}$		10 $\frac{1}{4}$
Streak.....				
Coal.....		4		5
Pyrites.....				
Coal.....		3 $\frac{1}{2}$	1	10 $\frac{1}{4}$
Streak.....				
Coal.....	1	6		
Floor, smooth shale				
Thickness of bed.....	2	8 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Thickness of sample.....	2	6 $\frac{3}{8}$	2	5 $\frac{1}{4}$

Section *A* was cut from face of room 29 off 7 east entry 2,650 feet from mouth of slope; section *B* was cut from face of room 57 off 5 east entry, 2,600 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2 $\frac{1}{2}$ -, and 1 $\frac{1}{4}$ -inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 125 tons.

McAlester Edwards Coal Co. Mine, Pittsburg

Analysis 189, page 35. Bituminous coal, McAlester district, from McAlester Edwards No. 2 mine, a slope mine, ½ mile north of Pittsburg, on the Missouri, Kansas, & Texas, and the Chicago, Rock Island & Pacific Railroads. Coal bed, McAlester; thickness of bed, 3 feet 5 inches. Average cover at points sampled, 720 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 18, 1928, as described below:

Sections of coal bed in McAlester Edwards No. 2 mine

(Laboratory No. 189)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and rash						
Coal.....		4		5		5
Pyrites.....						
Coal.....		5		5		4
Pyrites.....						
Coal.....	1	2		7		7
Streak.....						
Coal.....	1	3	1	11	1	10
Floor, rough shale						
Thickness of bed.....	3	4	3	5	3	4
Thickness of sample.....	3	2	3	4	3	4

Section *A* was cut from face of room 49 off 11 west entry, 4,700 feet from mouth of slope; section *B* was cut from face of room 3 off panel B, 3,650 feet from mouth of slope; section *C* was cut from face of room 35, off 11 east entry, 3,750 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, 1¼-, and ¾-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 150 tons.

McAlester Edwards Coal Co. Mine, Pittsburg

Analysis 190, page 34. Bituminous coal, McAlester district, from McAlester Edwards No. 4 mine, a slope mine, 1½ miles west of Pittsburg, on the Missouri, Kansas, & Texas Railroad. Coal bed, McAlester; thickness of bed, 3 feet 1 inch. Cover at points sampled: *A*, 400 feet; *B*, 350 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 18, 1928, as described below:

Section of coal bed in McAlester Edwards No. 4 mine

(Laboratory No. 190)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate of medium hardness				
Coal.....		11		11
Pyrites.....				
Coal.....		10		10
Streak.....				
Coal.....	1	3	1	3
Floor, soft slate				
Thickness of bed.....	3	1	3	1
Thickness of sample.....	3	1	3	1

Section *A* was cut from face of cross cut of main slope, 700 feet from mouth of slope; section *B* was cut from face of room 9 off 3 east entry, 400 feet from main slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, 1¼-, and ¾-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 150 tons.

Blanco Coal Co. Mine, Blanco

Analysis 191, page 31. Bituminous coal, McAlester district, from Blanco Coal Co. No. 2 mine, a slope mine, 2 miles southwest of Blanco, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed, 2 feet 9 inches. Average cover at points sampled 750 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 19, 1928, as described below:

Sections of coal bed in Carbon Coal Co. No. 2 mine

(Laboratory No. 191)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....	7		8	
Pyrites.....		$\frac{1}{8}$		$\frac{1}{8}$
Coal.....	4		5	
Pyrites.....				
Coal.....	1	10	1	7
Floor, rough slate				
Thickness of bed.....	2	9 $\frac{1}{8}$	2	8 $\frac{1}{8}$
Thickness of sample.....	2	9 $\frac{1}{8}$	2	8 $\frac{1}{8}$

Section *A* was cut from face of 6 west entry, 1,650 feet from mouth of slope; section *B* was cut from face of room 77 off 3 west entry, 2,750 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2 $\frac{1}{2}$ -, and 1 $\frac{1}{4}$ -inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 200 tons.

Pfeiffer Coal Co. Mine, Savanna

Analysis 192, page 35. Bituminous coal, McAlester district, from Pfeiffer Coal Co. No. 1 mine, a slope mine, 2 miles south of Savanna, on the Missouri, Kansas, & Texas Railroad. Coal bed, McAlester; thickness of bed, 3 feet 7 inches. Average cover at points sampled, 450 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 19, 1928, as described below:

Section of coal bed in Pfeiffer Coal Co. No. 1 mine

(Laboratory No. 192)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, slate				
Coal.....	1	9	2	1
Pyrites.....				
Coal.....	1	4	1	6
Floor, slate				
Thickness of bed.....	3	14	3	7 $\frac{1}{4}$
Thickness of sample.....	3	1	3	7

Section *A* was cut from face of room 2 off 3 north entry, 580 feet from mouth of slope; section *B* was cut from face of 3 north entry, 610 feet from mouth of slope.

System of mining, panel. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes. The daily output at time of sampling was 50 tons.

Jackson, Hunter and Gould Mine, Adamson

Analysis 193, page 31. Bituminous coal, McAlester-Adamson district, from Adamson No. 7 mine, a slope mine, $\frac{1}{2}$ mile northeast of Adamson, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed, 2 feet 7 inches. Average cover at points sampled, 500 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 20, 1928, as described below:

Sections of coal bed in Adamson No. 7 mine

(Laboratory No. 193)

SECTION	A		B	
	Fl.	in.	Fl.	in.
Roof, rough slate, 6 in. bony layer				
Coal.....	2		9	
Dirt band.....				$\frac{1}{8}$
Coal.....	5 $\frac{1}{2}$		2	
Pyrites and mother coal.....	2	1	5	
Coal.....		$\frac{1}{8}$		$\frac{1}{8}$
Streak.....	7		5	
Coal.....	2		6	
Pyrites.....		$\frac{1}{8}$	1	
Coal.....	1	2 $\frac{1}{2}$		
Floor				
Thickness of bed.....	2	7 $\frac{1}{4}$	2	9 $\frac{1}{4}$
Thickness of sample.....	2	7 $\frac{1}{4}$	2	9 $\frac{1}{4}$

Section *A* was cut from face of room 14 off 5 west entry, 132 feet from mouth of slope; section *B* was cut from face of room 14 off 5 east entry, 1,340 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2 $\frac{1}{2}$ -, and 1 $\frac{1}{4}$ -inch sizes on screens. The daily output at time of sampling was 125 tons.

Pittsburg County Coal Co. Mine, Adamson

Analysis 194, page 30. Bituminous coal, McAlester district, from Pittsburg County Coal Co. No. 5 mine, a slope mine, 5 miles west of Adamson, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed 3 feet 1 inch. Average cover at points sampled, 485 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 20, 1928, as described below:

Sections of coal bed in Pittsburg County Coal Co. No. 5 mine

(Laboratory No. 194)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough slate and sandstone						
Coal.....	6		8		4	
Streak pyrites.....						
Coal.....	1		9		1	3
Mother coal streak.....						
Coal.....	1½	1	4		10½	
Streak pyrites.....						
Coal.....	1	10	4		6½	
Streak.....						
Coal.....		7				
Floor						
Thickness of bed.....	3	1½	3	1	3	0
Thickness of sample.....	3	1½	3	1	3	0

Section *A* was cut from face of 9 west entry, 1,200 feet from mouth of slope; section *B* was cut from face of 9 east entry, 1,175 feet from mouth of slope; section *C* was cut from face of room 12 off 6 west entry, 1,285 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on screens and picked on cars. The daily output at time of sampling was 300 tons.

Sukenia Coal Co. Mine, Manning

Analysis 195, page 34. Bituminous coal, McAlester district, from Manning No. 4 mine, a slope mine, ¾ mile north of Manning, on the Missouri, Kansas, & Texas Railroad. Coal bed, McAlester; thickness of bed 2 feet 4 inches. Average cover at points sampled, 160 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 21, 1928, as described below:

Sections of coal bed in Manning No. 4 mine

(Laboratory No. 195)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....		8½		4½
Pyrites and mother coal.....				1½
Coal.....	1	6½	1	11½
Floor, smooth slate				
Thickness of bed.....	2	3	2	5½
Thickness of sample.....	2	3	2	4

Section *A* was cut from face of 3 west entry, 510 feet from mouth of slope; section *B* was cut from face of room 9 off 2 east entry, 540 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and 1½-inch sizes on screens. The daily output at time of sampling was 75 tons.

Pierce Coal Co. Mine, Adamson

Analysis 196, page 30. Bituminous coal, McAlester district, from Pierce No. 1 mine, a slope mine, 2 miles east of Adamson, on the Missouri, Kansas, & Texas Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 3 inches. Average cover at points sampled, 80 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 21, 1928, as described below:

Sections of coal bed in Pierce No. 1 mine

(Laboratory No. 196)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and 12 in. rash				
Coal.....	1	9	1	6½
Pyrites and mother coal.....				
Coal.....	1	5½	1	8½
Floor				
Thickness of bed.....	3	2½	3	3
Thickness of sample.....	3	2½	3	3

Section *A* was cut from face of room 36 off 8 west entry, 2,325 feet from mouth of slope; section *B* was cut from face of room 32 off 10 east entry 2,520 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens. The daily output at time of sampling was 200 tons.

Messina Coal Co. Mine, Haileyville

Analysis 197, page 32. Bituminous coal, McAlester district, from Messina Coal Co. No. 2 mine, a slope mine, 3 miles northeast of Haileyville, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne, thickness of bed, 3 feet. Average cover at points sampled, 600 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 23, 1928, as described below:

Sections of coal bed in Messina Coal Co. No. 2 mine

(Laboratory No. 197)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate; 0-10 in. bony layer						
Coal.....		9½	1	3		8½
Pyrites.....				¼		¼
Coal.....	1	1½	2	4	1	0
Streak bony.....				6		¼
Coal.....	1	1½				9
Thickness of bed.....	3	¼	3	7¼	2	5¼
Thickness of sample.....	3	¼	3	1¼	2	5¼

Section *A* was cut from face of room 17 off 7 east entry, 3,900 feet from mouth of slope; section *B* was cut from face of 7 west entry, 3,400 feet from mouth of slope; section *C* was cut from face at cross cut at bottom of slope, 3,200 feet from mouth.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 500 tons.

Richards-Thompson Coal Co. Mine, Bache

Analysis 198, page 31. Bituminous coal, McAlester district, from Richards-Thompson No. 5 mine, a slope mine, 2½ miles northwest of Bache, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed, 2 feet 10 inches. Average cover at points sampled, 300 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 23, 1928, as described below:

Sections of coal bed in Richards-Thompson No. 5 mine

(Laboratory No. 198)

SECTION	A		B	
Roof, slate and 2½ in. bony layer				
Coal.....		8½		4½
Pyrites.....		¼		
Coal.....	1	10		8
Pyrites.....				¼
Coal.....			1	
Streak.....				
Coal.....				10
Floor, slate				
Thickness of bed.....	2	6½	2	10½
Thickness of sample.....	2	6½	2	10½

Section *A* was cut from face of 5 east entry, 1,200 feet from mouth of slope; section *B* was cut from face of room 17 off 4 east entry, 1,510 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down with black powder; permissible explosive used on roof. Coal was separated into mine run sizes on screens. The daily output at time of sampling was 50 tons.

Milby-Dow Coal and Mining Co. Mine, Dow

Analysis 199, page 32. Bituminous coal, McAlester district, from Milby-Dow No. 9 mine, a shaft mine, ¼ mile west of Dow, on the Chicago, Rock Island, and Pacific Railroad. Coal bed, McAlester; thickness of bed, 3 feet. Cover at points sampled: *A*, 800 feet; *B*, 343 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 24, 1928, as described below:

Sections of coal bed in Milby-Dow No. 9 mine

(Laboratory No. 199)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough slate						
Coal.....		9½		4½		10½
Streak pyrites.....						
Coal.....		11½	1	8½		8½
Streak.....		1				
Coal.....	1	2		2½	1	3½
Streak.....						
Coal.....				5½		
Floor, slate						
Thickness of bed.....	3	0	2	9	2	10½
Thickness of sample.....	2	11	2	9	2	10½

Section *A* was cut from face of 3 south entry, 3,200 feet from mouth of slope; section *B* was cut from face of room 10 off 2 north entry, 4,150 feet from mouth of slope; section *C* was cut from face of room 107 off main south, 5,876 feet from mouth of slope.

System of mining, room and pillar and long wall. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 500 tons.

Milby-Dow Coal and Mining Co. Mine, Dow

Analysis 200, page 31. Bituminous coal, McAlester district, from Milby-Dow No. 10 mine, a slope mine, 2 miles northwest of Dow, on the Chicago, Rock Island & Pacific Railroad. Coal bed, McAlester; thickness of bed, 2 feet 10 inches. Average cover at points sampled, 490 feet. The bed was measured and sampled at two points by J. E. Moose and W. C. Robbins, July 24, 1928, as described below:

Sections of coal bed in Milby-Dow No. 10 mine

(Laboratory No. 200)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....		7½		6
Pyrites.....				
Coal.....		9½		1½
Streak.....				
Coal.....		7	1	6½
Pyrites.....				
Coal.....		8½		8½
Floor, slate				
Thickness of bed.....	2	8½	2	10½
Thickness of sample.....	2	8½	2	10½

Section *A* was cut from face of room 13 off 10 east entry, 2,840 feet from mouth of slope; section *B* was cut from face of room 9 off 10 east entry, 2,720 feet from mouth of slope.

System of mining, room and pillar. Coal undercut by hand and shot down from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on shaker screens and picked on cars. The daily output at time of sampling was 350 tons.

Rock Island Improvement Co. No. 10 Mine, Hartshorne

Analysis 201, 202, 203, and 204; page 33. Bituminous coal, Hartshorne district, from Rock Island No. 10 mine, a shaft mine, 3 miles east of Hartshorne, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne, thickness of bed 3 feet 8 inches. Cover at points sampled: 201, 625 feet; 202, 620 feet; 203, 600 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 25, 1928, as described below:

Sections of coal bed in Rock Island No. 10 mine

(Laboratory Nos. 201, 202, 203, 204)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate						
Coal.....		11		2½		4
Pyrites.....						
Coal.....	1	3		4	1	8
Pyrites.....						
Coal.....	1	5	1	7	1	8
Pyrites.....				½		
Coal.....			1	7		
Floor, smooth slate						
Thickness of bed.....	3	7	3	9	3	8
Thickness of sample.....	3	7	3	8½	3	8

Section *A* (201) was cut from face of room 38 off 4 east off main south, 3,000 feet from mouth of shaft; section *B* (202) was cut from face of room 19 off 5 east, 2,200 feet from bottom of shaft; section *C* (203) was cut from face of room 4 off east, 3,200 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into standard sizes on gravity screens and picked on cars. The daily output at time of sampling was 750 tons.

Rock Island Improvement Co. Mine, Hartshorne

Analysis 205, page 33. Bituminous coal, Hartshorne district, from lower Hartshorne mine, a shaft (535 ft.) mine, 1 mile east of Hartshorne, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne, thickness of bed, 3 feet 7 inches to 4 feet 6 inches. Average cover at points sampled 375 feet. The bed was measured and sampled at three points by J. E. Moose and W. C. Robbins, July 26, 1928, as described below:

Sections of coal bed in Rock Island No. 7 mine

(Laboratory No. 205)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough slate						
Coal.....	1	3	1	9	3	1
Streak.....						½
Coal.....	2	4	2	1	1	5
Floor, smooth slate						
Thickness of bed.....	3	7	3	10	4	6½
Thickness of sample.....	3	7	3	10	4	6

Section *A* was cut from face of air course off 10 west entry, 4,400 feet from shaft; section *B* was cut from face of main north entry, 4,250 feet from shaft; section *C* was cut from face of 4 south entry, 4,270 feet from shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into standard sizes on gravity screens and picked on cars. The daily output at time of sampling was 550 tons.

Rock Island Improvement Co. Mine, Hartshorne

Analyses 206, 207, 208, and 209, pages 32, 33. Bituminous coal, Hartshorne district, from Rock Island No. 12 mine, a shaft mine, 4 miles northeast of Hartshorne, on the Chicago, Rock Island & Pacific Railroad. Coal bed, lower Hartshorne; thickness of bed, 3 feet 4 inches to 4 feet 2 inches. Cover at points sampled: 206, 615 feet; 207, 315 feet; 208, 360 feet; and 209, 60 feet. The bed was measured and sampled at four points by J. E. Moose and W. C. Robbins, July 27, 1928, as described below:

Sections of coal bed in Rock Island No. 12 mine

(Laboratory Nos. 206, 207, 208, 209)

SECTION	A		B		C		D	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough slate								
Coal.....	7½	1	10½	2	4	1	4	
Pyrites.....						½		
Coal.....	9	2	3½		6	1		
Pyrites and mother coal.....		½			1	2		½
Coal.....	8							9
Streak.....		½						
Coal.....	1	3						5
Floor, hard slate								
Thickness of bed.....	3	4½	4	2	4	3	3	6½
Thickness of sample.....	3	4½	4	2	4	3	3	6½

Section *A* (206) was cut from face of 9 east slope, 3,900 feet from shaft; section *B* (207) was cut from face of 3 east off main west plane, 3,700 feet from shaft; section *C* (208) was cut from face of main west slope, 4,100 feet from shaft; section *D* (209) was cut from face of 11 main east plane, 4,600 feet from shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into standard sizes on gravity screens and picked on cars. The daily output at time of sampling was 1,050 tons.

McAlester Fuel Co. Mine, McAlester

Analysis 211, page 34. Bituminous coal, McAlester district, from Carbon No. 4 mine, a slope mine, 6 miles east of McAlester, ½ mile haul by wagon to railroad. Coal bed, McAlester; thickness of bed, 3 feet 2 inches. Cover at points sampled: *A*, 100 feet; *B*, 275 feet. The bed was measured at two points by J. E. Moose and W. C. Robbins, July 28, 1928, as described below:

Sections of coal bed in Carbon No. 4 mine

(Laboratory No. 211)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, rough slate above 1 in. bone				
Coal.....		1½		3
Streak.....				
Coal.....		8½		4½
Pyrites.....				
Coal.....		10½		1
Streak.....				
Coal.....	1	½		8½
Mother coal.....				
Coal.....		3		9½
Pyrites.....				
Coal.....				11½
Floor, slate				
Thickness of bed.....	3	0	3	2
Thickness of sample.....	3	0	3	2

Section *A* was cut from face of room 12 off 1 west entry, 700 feet from mouth of slope; section *B* was cut from face of 3 west, 900 feet from mouth of slope.

System of mining, panel. Coal undercut by hand and shot from solid with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-inch, and slack sizes. The daily output at time of sampling was 5 tons.

ROGERS COUNTY

Bushyhead Coal Co. Mine, Bushyhead

Analysis 177, page 36. Bituminous coal, northeastern Oklahoma district, from Bushyhead Coal Co. No. 1 strip pit, a wagon mine, 1½ miles north of Bushyhead. Coal bed, Fort Scott; thickness, 1 foot 6 inches. Cover at point sampled, 24 feet. Sampled at three places in pit. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, July 10, 1928, as described below:

Section of coal bed in Bushyhead Coal Co. No. 1 strip pit

(Laboratory No. 177)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and clay						
Bony coal.....	2		1		0	
Coal.....	1	3	1	6	1	6
Floor, clay						
Thickness of bed.....	1	3	1	6	1	6
Thickness of sample.....	1	3	1	6	1	6

System of mining, stripped with steam shovel. Coal shot with black powder and loaded into trucks which haul it to the Frisco Railroad. Average daily output, 125 tons, all from advance workings.

TULSA COUNTY

Henry Adamson Coal and Mining Co. Mine, Tulsa

Analysis 172, page 36. Bituminous coal, northeastern Oklahoma district, from Henry Adamson No. 1 mine, a shaft mine, 4½ miles east of Tulsa, on the Frisco Railroad. Coal bed, Dawson; thickness of bed, 2 feet 6 inches. Cover at point sampled, 85 feet. The bed was measured and sampled at two points by J. E. Moose and W. R. Rutherford, July 6, 1928, as described below:

Sections of coal bed in Henry Adamson No. 1 mine

(Laboratory No. 172)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate				
Coal.....	2	7	2	5½
Floor, shale				
Thickness of bed.....	2	7	2	5½
Thickness of sample.....	2	7	2	5½

Section *A* was cut from face of room 13 off 5 west entry, 3,000 feet from bottom of shaft; section *B* was cut from face of main west entry, 3,050 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump and modified lump sizes on grizzly screens and picked on cars. The daily output at time of sampling was 150 tons.

Adamson Coal Co. Mine, Tulsa

Analysis 173, page 36. Bituminous coal, northeastern Oklahoma district, from Pauline No. 1 mine, a shaft mine, 4½ miles east of Tulsa on 15th street, on the Frisco Railroad. Coal bed, Dawson; thickness of bed, 2 feet 5 inches. Cover at points sampled, 75 feet. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, July 7, 1928, as described below:

Sections of coal bed in Pauline No. 1 mine

(Laboratory No. 173)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, hard slate						
Coal.....	2	3½	2	5½	2	3
Floor, shale						
Thickness of bed.....	2	3½	2	5½	2	3
Thickness of sample.....	2	3½	2	5½	2	3

Section *A* was cut from face of room 14 off 2 west entry, 2,000 feet from bottom of shaft; section *B* was cut from face of main south entry, 2,500 feet from bottom of shaft; section *C* was cut from face of room 6 off 2 east entry, 2,500 feet from bottom of shaft.

System of mining, room and pillar. Coal undercut by machine and shot down with black powder; permissible explosive used on roof. Coal was separated into lump, 4-, 2½-, and 1¼-inch sizes on screens and picked on cars. The daily output at time of sampling was 150 tons.

Leavell Coal Co. Mine, Tulsa

Analysis 174, page 37. Bituminous coal, northeastern Oklahoma district, from Leavell Coal Co. No. 1 mine, a strip and drift mine, 4½ miles northeast of Tulsa, on the Frisco Railroad. Coal bed, Dawson; thickness of bed, 2 feet. Cover at points sampled: *A*, 40 feet; *B*, 40 feet; *C*, 60 feet at drift. The bed was measured and sampled at three points by J. E. Moose and W. R. Rutherford, July 7, 1928, as described below:

Sections of coal bed in Leavell Coal Co. No. 1 mine

(Laboratory No. 174)

SECTION	A		B		C	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, slate and clay						
Coal.....	1	11	1	11	2	0
Floor, clay and shale						
Thickness of bed.....	1	11	1	11	2	0
Thickness of sample.....	1	11	1	11	2	0

Section *A* was cut from face of stripped seam near middle of pit; section *B* was cut from face of stripped seam, 150 yards northwest of middle of pit; section *C* was cut from face of main entry in drift mine, 1,200 feet from opening.

System of mining, stripping with steam shovel in strip pit and room and pillar in drift mine. Coal removed from face to cars on skids after shooting down with black powder; permissible explosive used on roof. Coal was separated into lump, 2½-, and 1¼-inch sizes on screens and picked on cars. The daily output at time of sampling was 500 tons.

Tulsa County Coal Co. Mine, Collinsville

Analysis 176, page 36. Bituminous coal, northeastern Oklahoma district, from Tulsa County Coal Co. strip pit, 1½ miles southwest of Collinsville. Coal bed, Dawson; thickness, 1 foot 6 inches. Cover at point sampled, 23 feet. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, July 9, 1928, as described below:

Section of coal bed in Tulsa County Coal Co. mine

(Laboratory No. 176)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, shale and clay				
Bony coal.....		1		1
Coal.....	1	5	1	6
Floor, clay				
Thickness of bed.....	1	6	1	7
Thickness of sample.....	1	6	1	7

System of mining, stripped with steam shovel. Coal shot from solid with black powder and loaded with power shovel. Average daily output, 350 tons, all from advance working.

WAGONER COUNTY

Seneca Coal and Coke Co. Mine, Broken Arrow

Analysis 175, page 37. Bituminous coal, northeastern Oklahoma district, from Seneca Coal and Coke Co. strip pit, 3 miles east of Broken Arrow. Coal bed, unnamed; thickness, 1 foot 11 inches. Cover at point sampled, 26 feet. The bed was measured and sampled by J. E. Moose and W. R. Rutherford, June 9, 1928, as described below:

Section of coal bed in Seneca Coal and Coke Co. strip pit

(Laboratory No. 175)

SECTION	A		B	
	<i>Ft.</i>	<i>in.</i>	<i>Ft.</i>	<i>in.</i>
Roof, 10 ft. shale and 16 ft. dirt				
Bony coal.....		1		1
Coal.....	1	10½	1	10
Floor, clay				
Thickness of bed.....	1	11½	1	11
Thickness of sample.....	1	11½	1	11

System of mining, stripped with steam shovel, Coal shot with black powder and loaded with shovel onto tram train and from tram train to tippie. Average daily output, 1,200 tons, all from advanced workings. Sizes, lump, 2½-, and 1¼-inches.

THE UTILIZATION OF "UNIT COAL" B. T. U. VALUES

The term "unit coal"¹⁰ was first suggested by S. W. Parr and W. F. Wheeler of the University of Illinois in 1913. A more extensive study of the constancy of "unit coal" as indicated by its heat content, was made by S. W. Parr and J. E. Moose in 1922.¹¹

The term "unit coal" is intended to stand for the actual or pure coal substance as derived from taking into consideration the changes which take place during the ashing of coal. It is somewhat synonymous with the terms "combustible", "ash and water free", and "pure coal", and it is intended to represent the actual

10. Parr, S. W., and Wheeler, W. F., "Unit Coal" and the composition of coal ash: Univ. of Illinois, Exp. Sta. Bull. 37, 191.

11. Moose, J. E., and Parr, S. W., The extent and applicability of "Unit Coal": Thesis, Univ. of Illinois, 1922.

coal substance. It is assumed that the ash as weighed by the analyst is not the same as the ash as it exists in the coal. The ashing process changes the pyrites in the coal to ferric oxide and causes the clayey constituents to lose water of hydration.

It is not the purpose of the writers to go into detail concerning the derivation of the above term or the formula for "unit coal" B. t. u. Those interested should consult Bulletin 37, University of Illinois Experiment Station, or "Fuel, Gas, Water, and Lubricants", by S. W. Parr and published by McGraw-Hill Book Co. However, it is our purpose to show the benefits that may be derived by using the "unit coal" B. t. u. formula.

$$\text{"Unit Coal" B. t. u.} = \frac{A - (50 s)}{100 - (m + 1.08a + 0.55s)} \times 100$$

A = "as received" B. t. u.; s = per cent sulfur; m = per cent moisture; and a = per cent ash.

It has been definitely proven (footnotes 10, 11) that the heat value of the "unit coal" substance from a particular mine or locality remains approximately the same regardless of the per cent of moisture, ash, or other inert matter present. Therefore, the heat values found in table 2, column 12, are of practical value in the making and checking of coal contracts. They are convenient for checking guarantees on coal bids and for verifying the samples submitted as to their agreement with the gross shipment.

THE MAKING OF COAL CONTRACTS

Suppose it is desired to know what heat value can be guaranteed on a delivery from a mine in the Henryetta District, when the mine can deliver material averaging 5 per cent moisture, 6 per cent ash, and 2 per cent sulfur. The delivered heat value is found by substituting these values in the formula for "unit coal" B. t. u. and taking "unit coal" B. t. u. values from table 2, column 12. ("Unit Coal" B. t. u., Henryetta District = 14,900).

$$\begin{aligned} \text{B. t. u. delivered coal} - 50 \cdot s &= \text{"Unit Coal" B. t. u.} \frac{[100 - (m + 1.08a + 0.55s)]}{100} \\ &= \frac{14,900}{100} \frac{[100 - (5 + 1.08 \times 6 + 0.55 \times 2)]}{100} + 50 \times 2 \\ &= 13,040 \end{aligned}$$

A casual inspection of the "unit coal" B. t. u. formula obviously shows that by utilizing the "unit coal" B. t. u. values given in table 2, column 12, and by substituting known values for three of the factors, it is possible to calculate the remaining factor. The values calculated in this manner agree surprisingly well with values determined in the laboratory. The heat values calculated in this manner should enable both the producer and purchaser to arrive at a safe basis for guarantees on delivered coal.

VERIFICATION OF THE SAMPLES SUBMITTED AS TO THEIR AGREEMENT WITH GROSS SHIPMENTS

It sometimes occurs that samples from different shipments are mixed or that the samples submitted are from a locality other than that supplying the shipment. The samples may be identified and the locality of the mine supplying the samples determined by reference to the "unit coal" B. t. u. values in table 2. An illustration is as follows: A contract calls for Henryetta coal, Mine X. The gross shipment is received, samples are taken and analyzed and the analysis shows that the shipment does not closely resemble Henryetta coal. The "unit coal" B. t. u. is calculated and is found to be 15,300—15,400. An examination of table 2 reveals that only Craig County coals and those in the vicinity of Adamson, Pittsburg County, have this value. Reference to table 2 shows that the delivered sample has a lower "as received" B. t. u. and higher sulfur content than the coals in the vicinity of Adamson. This would be good evidence that the shipment received was Craig County coal instead of Henryetta coal.

THE VARIABLE IN HEAT VALUE FOR EACH UNIT OF ASH

The variable in the heat value of coal for each unit of ash may be determined by substituting different values for ash in the "unit coal" B. t. u. formula and calculating the "as received" B. t. u. in each case. The difference in the values obtained divided by the number of units of variation of the ash content will be the heat variable for each unit of ash. An illustration follows:

A coal from Simpson No. 4 slope at Bokoshe (table 2, sample 239) contains 2.3 per cent moisture, 6.6 per cent ash, 1.3 per cent sulfur, and "as received" B. t. u. 14,020. What would the "as received" B. t. u. be if improved mining methods reduced the ash content by one per cent, the sulfur and moisture content remaining the same? The "unit coal" B. t. u. of this mine is 15,600. Then by substituting the new condition in the formula, as:

$$\begin{aligned} \text{"As Received" B. t. u.} &= 15,600 \frac{[100 - (m + 1.08a + 0.55s)]}{100} + 50 \cdot s \\ &= 15,600 \frac{[100 - (2.3 + 1.08 \times 5.64 + 0.55 \times 1.3)]}{100} + 50 \times 1.3 \\ &= 14,115. \end{aligned}$$

The variable in heat value for a unit of ash being;

$$14,115 - 14,020 = 95 \text{ B. t. u.}$$

DETECTING ERRORS IN ANALYTICAL RESULTS

The best analysts are not infallible. Referee analysts are still in demand. During the course of taking, preparing, and analysing a coal sample many opportunities for making mistakes present themselves and careless and irresponsible individuals are sometimes employed for a short time without the knowledge of the laboratory director.

Every mine operator should know the "unit coal" B. t. u. of his mine. This value will not vary more than one per cent and therefore affords a means of detecting errors in analytical results. When an analysis report is received the "unit coal" B. t. u. should be calculated by substituting moisture, ash, sulfur, and "as received" B. t. u. values in the "unit coal" formula. If the calculated value does not agree to within one per cent of that given in table 2, column 12, it is evident that some part of the analyst's report is in error. The factor in error can usually be identified by making a comparison of the report in error with other reliable reports that may be available. If the report is to be made the basis of a contract it would be more desirable to use a referee chemist than to take a penalty in excess of the referee's services.

CALCULATING HEAT VALUES IN THE ABSENCE OF AN INSTRUMENT

Many dealers in coal pay little attention to the value of coal analyses and therefore hesitate to either install equipment for making analyses or to submit samples to a competent chemist. This, of course, is due to the expense involved. The most difficult determination, and that requiring the most expensive equipment is the heat value. Determination of moisture, volatile matter, ash, and sulfur does not require expensive equipment and when these values are available on any coal they may be utilized along with the "unit coal" B. t. u. in calculating the "as received" B. t. u. An illustration follows:

The moisture (4.4), ash (8.0), and sulfur (2.0) content of a Hartshorne coal is known, but a calorimeter is not available for determining the "as received" B. t. u. The party concerned does not care to bear the expense of having a chemist make such a determination. It can be calculated as follows:

$$\begin{aligned} \text{"As Received" B.t.u.} &= \text{"unit coal" B.t.u.} \frac{[100 - (m + 1.08a + 0.55s)]}{100} + 50 \cdot s \\ &= 15,200 \frac{[100 - (4.4 + 1.08 \cdot 8 + 0.55 \cdot 2)]}{100} + 50 \cdot 2 \\ &= 13,160. \end{aligned}$$

COMPARATIVE EVALUATION OF OKLAHOMA COALS BASED ON ANALYSES LISTED IN TABLE 2

Many requests have been made of the writer to evaluate the coal from the various producing districts in Oklahoma. The large consumer or operator usually employs some method for determining the relative values of the coals which he consumes or produces. The consumer is chiefly interested in analyses, boiler tests, and physical characteristics of the coals. The producer usually bases his price on production costs and market conditions. The middlemen are naturally most interested in what the coal can be bought and sold for. The fireman has his preferences which are based upon his experience. The chemist places special emphasis on heat values, ash, ash softening point, and sulfur, if the coal is to be used for steam or heating purposes. The importance of volatile matter and ash softening point may be emphasized by the gas manufacturer. Therefore, no method of evaluation can be expected to have general adoption. There are too many factors involved. One coal may have a decided advantage over a competing coal from the standpoint of its analysis and on the other hand the competing coal may be more desirable since it handles with less production of slack and weathers well. In view of the above, it is not expected that the method which follows will be suitable under all circumstances. It should be thoroughly understood that it is based upon the analyses as listed in table 2 and that a delivered coal showing a different analysis would have to be calculated in the same manner in order to justify a comparison. The method and tables which follow are submitted for what they may be worth to those who care to use them and no attempt is being made at price fixing.

The method employed is similar to one that has proved very practical over a period of years in a great coal producing state in the middle west. It differs from the procedure used by the Board of Administration of Illinois¹² in the purchase of coals for state institutions, in that a 6 per cent ash coal is taken as the standard instead of the highest ash coal. A coal from the McAlester district containing 6 per cent ash, on the dry basis, was selected as the standard for comparison. McAlester coal is widely known throughout the southwest and the ash content, on the dry basis, from that district averages about 6 per cent.

The method consists in listing all coals giving British thermal units on the "as received" basis and ash on the dry basis. These values become the standards. All bids are adjusted to the same ash percentage. Each 1 per cent of ash content below 6 per cent is assumed to have a positive value of 2 cents per ton, and accordingly the bid price is decreased by 2 cents. Each per cent of ash

12. Parr, S. W., Purchase and sale of Illinois coals on specification: Illinois State Geol. Survey, Bull. 29, 1914.

content above 6 per cent is assumed to have a negative value of 2 cents per ton and the bid price is increased by 2 cents. Fractions of a per cent are given proportional values.

On the basis of the adjusted price allowance is made for the varying values by computing the cost of one million British thermal units for each coal. That is:

Price per ton adjusted for ash = Bid price in cents - 2 (6—dry ash in coal)

$$\text{Computed cost in cents per million B.t.u.} = \frac{\text{Bid price adjusted for ash}}{0.002 \cdot \text{"as received" B. t. u.}}$$

The coals are grouped according to the per cent sulfur which is present. All coals in Group 1 contain less than one per cent sulfur; Group 2, from 1 to 2 per cent inclusive; Group 3, from 2 to 3 per cent inclusive; Group 4, from 3 to 4 per cent inclusive; Group 5, from 4 to 5 per cent inclusive; and Group 6, above 5 per cent.

Prices from \$1.00 to \$10.00 per ton are chosen as bid prices, as these prices will, with few exceptions, be either below or above most bid prices on slack or lump coal at the mine or at the local coal yard.

On the same page with the group tables will be found charts showing bid prices as abscissa (horizontal line) and cost per million B. t. u. as ordinates (vertical line) on the left side of the chart. On the right will be found the laboratory numbers represented by the lines on the chart. The lines are formed by connecting the point representing cost per million B. t. u. at \$10.00 with the point representing cost per million B. t. u. at \$1.00 on the same coal. This affords a means of finding the cost per million B. t. u. for any bid price between \$1.00 and \$10.00 per ton. The lines may be extended for lower or higher bids. If it is desired to know what price one coal should have in order to furnish a million B. t. u. at the same price as a competing coal, locate the lines representing the two coals, locate the point on the line vertically above the bid price of one coal, follow the horizontal line across until it intersects with the line representing the competing coal, and read vertically below the bid price on the competing coal.

The above illustration should show the value of the charts which follow. Once an analysis is agreed upon the chart will be of great assistance in deciding which coal to buy in order to get a million British thermal units at the least expense. For more accurate readings the values given in the tables should be plotted on a larger scale graph.

There may be some criticism to this method, since it does not take into consideration the softening point of the coal ash. In

this connection reference should be made to Technical Paper 411, Bureau of mines, by H. E. Fieldner, H. M. Cooper, and F. D. Os-good, which lists the softening points of a number of Oklahoma coals. This paper states that the coals of Oklahoma give ash of easy fusibility and that the majority will have fusion temperatures between 1,920° and 2,170° F., the only noticeable exception being the ash of the coals from the McAlester bed in Coal and Pittsburg counties, the softening point of which ranges from 2,130° to 2,290° F.

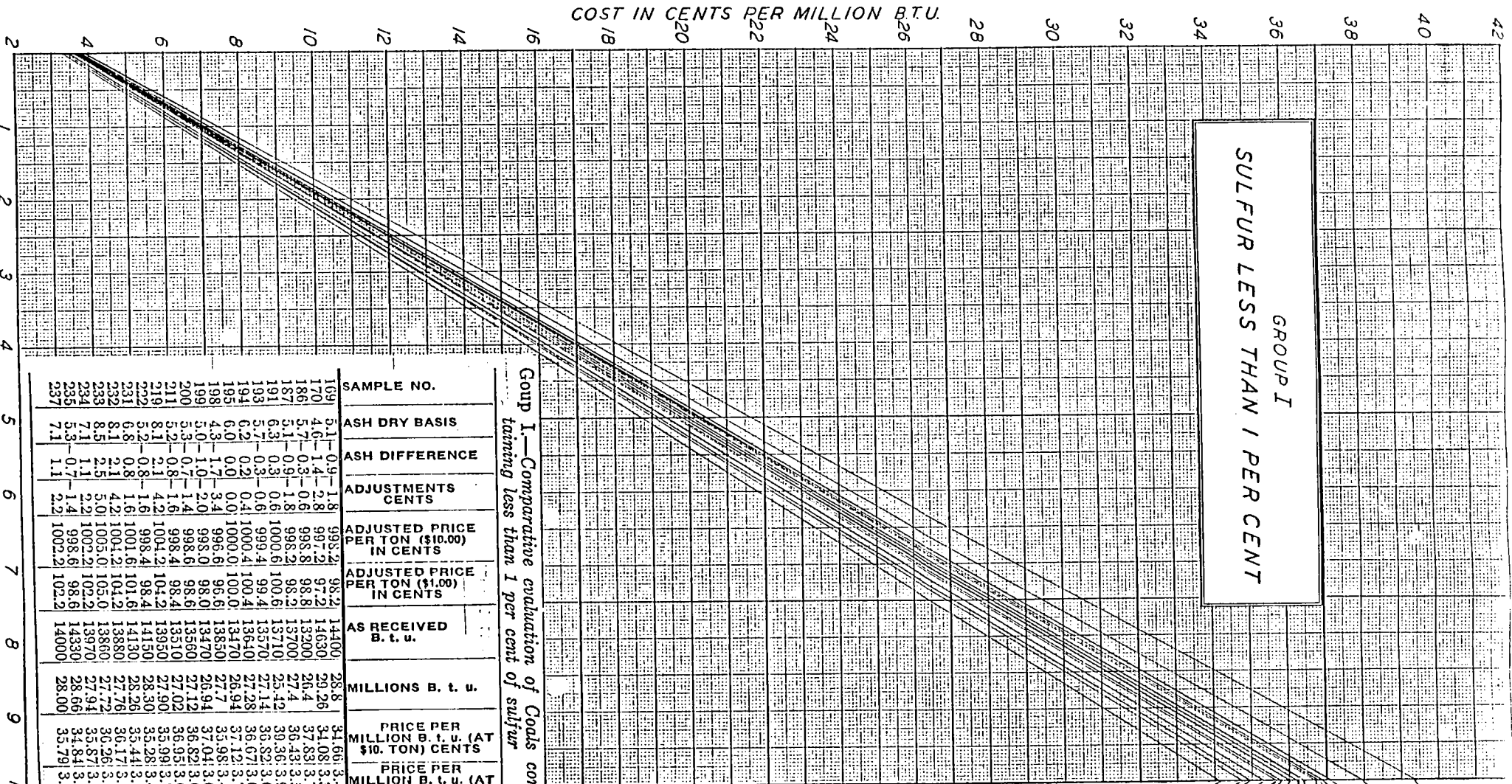
No consideration has been given to the fact that it costs as much to produce coal of low heat value as it does to produce coal of high heat value.

Operators of Coal Mines Described in This Report

NAME OF COMPANY	COUNTY	ADDRESS
E. H. Noel Coal Co.	Coal	Coalgato
Keystone Coal and Mining Co.	Coal	Coalgato
Robert L. Scott Leak Coal Co.	Craig	Vinita
C. Snodderly Coal Co.	Craig	Bluejacket
E. A. Bennett Coal Co.	Craig	Vinita
W. H. Stephenson	Craig	Welch
Kanima Consolidated Coal Co.	Haskell	Kanima
Barkley and Stum Coal Co.	Haskell	McCurtain
Garland Coal and Mining Co.	Haskell	Stigler
McAlester Colliery Co.	Latimer	Gowen
KaH-Inla Coal Co.	Latimer	Hartshorne
Hartshorne Coal Co.	Latimer	Hartshorne
Halley-Ola Coal Co.	Latimer	Wilburton
Oak Ridge Coal Co.	Latimer	Red Oak
M. K. & T. Coal Co.	Latimer	Wilburton
Peerless Smokeless Coal Co.	LeFlore	Bokoshe
E. X. L. Coal Co.	LeFlore	Bokoshe
Grayston Coal Co.	LeFlore	Bokoshe
Rees Coal Co.	LeFlore	Bokoshe
Heavener Smokeless Coal Co.	LeFlore	Heavener
Potter Smokeless Coal Co.	LeFlore	Howe
Standard Coal Mining Co.	LeFlore	Ft. Smith, Ark.
Dawes Bros. Coal Co.	LeFlore	Howe
Hunter Goodwin Coal Co.	LeFlore	Milton
Panama Smokeless Coal Co.	LeFlore	Panama
White Oak Coal Co.	LeFlore	Panama
Poteau Machine Coal Co.	LeFlore	Poteau
Pure Veln Coal Co.	LeFlore	Poteau
Mongolian Coal Co.	LeFlore	Poteau
Poteau Coal Corporation	LeFlore	Poteau
Oakland Coal Co.	LeFlore	Poteau
Superior Smokeless Coal & Mining Co.	LeFlore	Tahona
Covington Coal Co.	LeFlore	Tahona
Acme Semlanthracite Coal Co.	LeFlore	Williams

Operators of Coal Mines,—Continued

NAME OF COMPANY	COUNTY	ADDRESS
Chelsea Coal Co.	Mayes	Chelsea
French and York	Mayes	Chelsea
Trojan Coal Co.	Muskogee	Porum
Hughes Fuel Co.	Okmulgee	Henryetta
Wise-Buchanan Coal Co.	Okmulgee	Henryetta
Pittsburg-Midway Coal & Mining Co.	Okmulgee	Henryetta
Missing Link Coal Co.	Okmulgee	Schulter
Hillside Coal Co.	Okmulgee	Schulter
McGennis Coal Co.	Okmulgee	Henryetta
Warden-Pullen Coal Co.	Okmulgee	Henryetta
Cotton Coal Co.	Okmulgee	Henryetta
Elite Coal Co.	Okmulgee	Henryetta
Ben Hur Coal Co.	Okmulgee	Schulter
Star Coal Mining Co.	Okmulgee	Henryetta
Atlas Coal Co.	Okmulgee	Henryetta
Gatther Coal Co.	Okmulgee	Henryetta
Acme Coal and Mining Co.	Okmulgee	Henryetta
Pierce Coal Co.	Pittsburg	McAlester
Pittsburg County Coal Co.	Pittsburg	Carbon
Jackson, Hunter, and Gould	Pittsburg	Adamson
Richards-Thompson Coal Co.	Pittsburg	Bache
Banco Coal Co.	Pittsburg	Banco
Milby & Dow Coal & Mining Co.	Pittsburg	Dow
Messina Coal Co.	Pittsburg	Halleyville
Rock Island Improvement Co.	Pittsburg	Hartshorne
Old Town Coal Co.	Pittsburg	North McAlester
Sukernis Coal Co.	Pittsburg	Manning
Carbon Coal Co.	Pittsburg	McAlester
W. T. Mullin	Pittsburg	McAlester
McAlester-Edwards Coal Co.	Pittsburg	Pittsburg
Pfeffer Coal Co.	Pittsburg	Savanna
Southern Fuel Co.	Pittsburg	Savanna
Bushyhead Coal Co.	Rogers	Bushyhead
Tulsa County Coal Co.	Tulsa	Collinsville
Henry Adamson Coal & Mining Co.	Tulsa	Tulsa
Paul Adamson Coal Co.	Tulsa	Tulsa
Leavell Coal Co.	Tulsa	Tulsa
Seneca Coal and Coke Co.	Wagoner	Broken Arrow



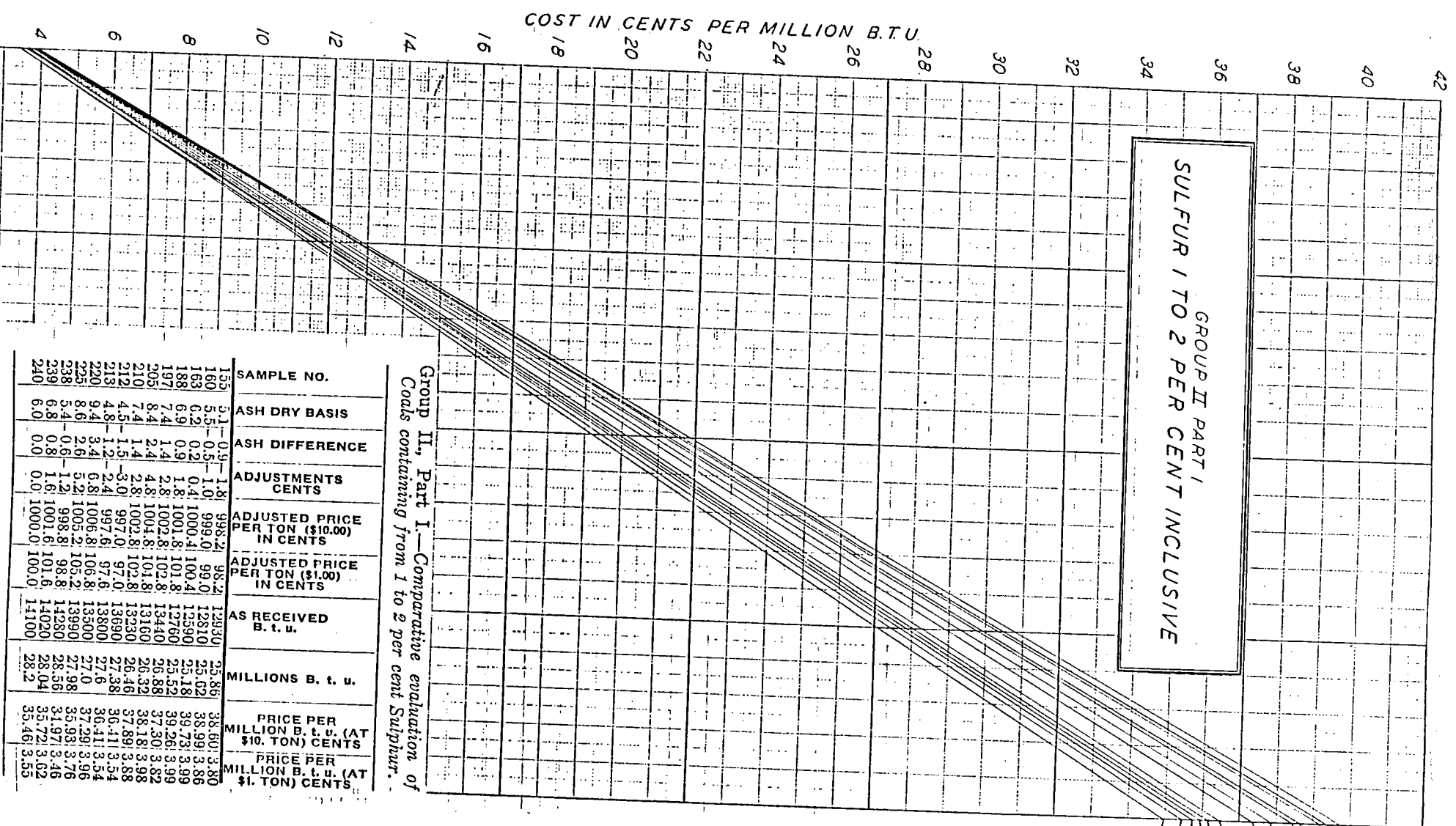
GROUP I
SULFUR LESS THAN 1 PER CENT

Group I—Comparative evaluation of Coals containing less than 1 per cent of sulfur

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10.00) CENTS	PRICE PER MILLION B. t. u. (AT \$1.00) CENTS
109	5.1	0.9	1.8	995.2	98.2	14400	28.8	34.66	3.41
170	4.6	1.4	2.8	997.2	97.2	14630	29.26	34.08	3.32
186	5.7	0.3	0.6	995.8	98.8	15200	26.4	37.83	3.74
187	5.1	0.9	1.8	995.2	98.2	15700	27.4	36.48	3.58
191	6.3	0.3	0.6	1000.6	100.6	15710	25.42	30.36	3.96
193	3.7	0.3	0.6	999.4	99.4	13570	27.14	35.82	3.66
194	6.2	0.2	0.4	1000.4	100.4	13640	27.28	36.67	3.68
195	6.0	0.0	0.0	1000.0	100.0	13470	26.94	37.12	3.71
198	4.3	1.7	3.4	996.6	96.6	13850	27.7	35.98	3.49
199	3.0	1.0	2.0	998.0	98.0	13470	26.94	37.04	3.64
200	3.3	0.7	1.4	998.6	98.6	13560	27.02	36.95	3.64
211	5.2	0.8	1.6	998.4	98.4	13510	27.02	36.95	3.64
219	8.1	2.1	4.2	1004.2	104.2	13950	27.90	35.91	3.78
222	5.2	0.8	1.6	998.4	98.4	14150	28.30	35.28	3.48
231	6.8	0.8	1.6	1001.6	101.6	14130	28.26	35.44	3.59
232	8.1	2.1	4.2	1004.2	104.2	13880	27.76	36.17	3.75
233	8.5	2.5	5.0	1005.0	105.0	13860	27.72	30.26	3.79
234	7.1	1.1	2.2	1002.2	102.2	13970	27.94	35.87	3.66
235	5.3	0.7	1.4	998.6	98.6	14330	28.66	34.84	3.44
237	7.1	1.1	2.2	1002.2	102.2	14000	28.00	35.79	3.65

L.S. NOS.
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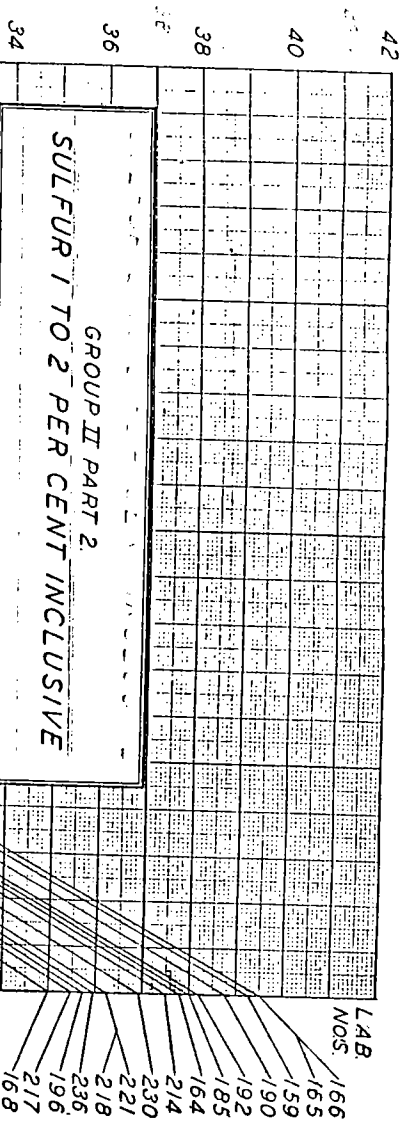
GROUP II PART I
SULFUR 1 TO 2 PER CENT INCLUSIVE



Group II, Part I—Comparative evaluation of Coals containing from 1 to 2 per cent Sulphur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10. TON) CENTS	PRICE PER MILLION B. t. u. (AT \$1. TON) CENTS
155	5.1	0.9	1.8	98.2	98.2	12930	25.86	38.60	3.80
160	5.3	0.5	1.0	99.0	99.0	12810	25.62	38.99	3.86
163	6.2	0.2	0.4	100.4	100.4	12590	25.18	39.73	3.99
188	6.9	0.9	1.8	100.8	101.8	12760	25.52	39.26	3.99
197	7.4	1.4	2.8	102.8	102.8	13440	26.88	37.30	3.82
205	8.4	2.4	4.8	104.8	104.8	13160	26.32	38.18	3.98
210	7.4	1.4	2.8	102.8	102.8	13230	26.46	37.89	3.88
212	4.5	1.5	3.0	97.0	97.0	13690	27.6	36.41	3.54
213	4.8	1.2	2.4	97.6	97.6	13800	27.6	37.29	3.96
220	9.4	3.4	6.8	106.8	106.8	13500	27.0	37.29	3.96
225	8.6	2.6	5.2	105.2	105.2	13990	27.98	35.93	3.76
238	5.4	0.6	1.2	98.8	98.8	14280	28.56	31.97	3.46
239	6.8	0.8	1.6	100.6	101.6	14020	28.04	35.72	3.62
240	6.0	0.0	0.0	100.0	100.0	14100	28.2	35.46	3.55

L.A.B. No's
163
188
160
155
205
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197
220
212
213
225
239
240
238



Group II, Part II—Comparative evaluation of Coals containing from 1 to 2 per cent Sulphur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B.t.u.	MILLIONS B.t.u.	PRICE PER MILLION B.t.u. (AT \$10. TON) CENTS	PRICE PER MILLION B.t.u. (AT \$1. TON) CENTS
169	5.8	0.2	0.4	999.6	99.6	12760	25.32	39.17	3.90
164	4.9	1.1	2.2	997.8	97.8	13180	26.36	37.85	3.71
165	7.4	1.4	2.8	1002.8	102.8	12720	25.44	39.42	4.04
166	0.9	0.9	1.8	1001.8	101.8	12680	25.36	39.50	4.01
188	3.0	1.0	2.0	998.0	98.0	14230	28.46	35.07	3.44
185	6.6	0.6	1.2	1001.2	101.2	13160	26.32	38.04	3.84
190	6.6	0.6	1.2	1001.2	101.2	12840	25.78	38.84	3.88
192	5.4	0.6	1.2	998.8	98.8	13060	26.12	38.84	3.88
195	4.2	1.8	3.6	996.4	96.4	13850	27.76	35.89	3.47
214	7.0	1.0	2.0	1002.0	102.0	13340	26.68	38.24	3.78
217	3.6	2.4	4.8	995.2	95.2	14000	28.00	35.54	3.40
218	3.7	0.3	0.6	999.4	99.4	13800	27.60	36.24	3.60
221	6.8	0.8	1.6	1001.6	101.6	13820	27.64	36.24	3.60
230	8.0	2.0	4.0	1004.0	104.0	13600	27.20	36.91	3.62
236	7.4	1.4	2.8	1002.8	102.8	13930	27.86	36.91	3.69

COST IN DOLLARS PER TON

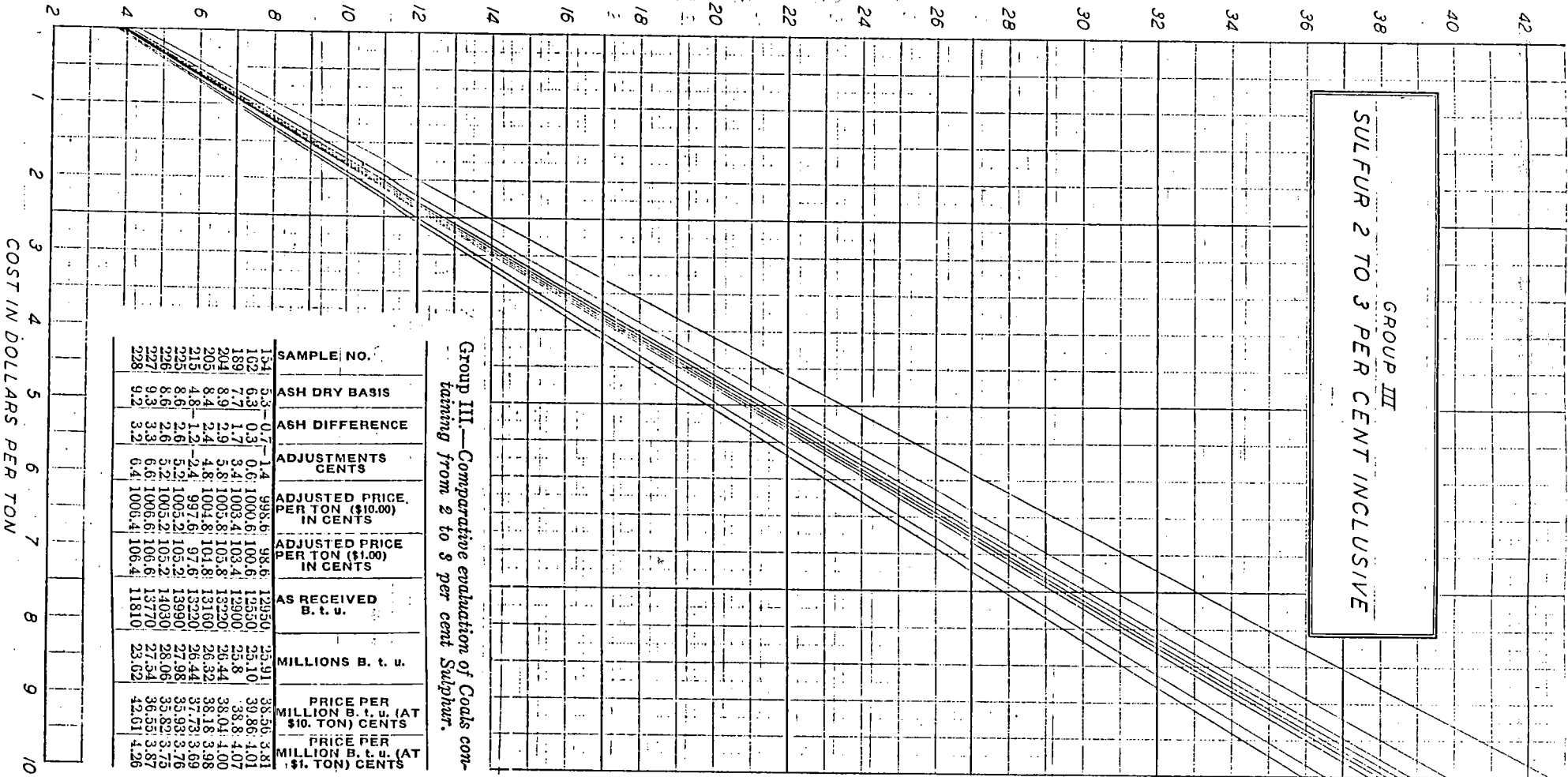
COST IN CENTS PER MILLION B.T.U.

LAB NOS.

- 166
- 165
- 159
- 190
- 192
- 185
- 164
- 214
- 230
- 221
- 218
- 236
- 196
- 217
- 168

GROUP III
SULFUR 2 TO 3 PER CENT INCLUSIVE

COST IN COST, IN CENTS PER MILLION BTU



Group III.—Comparative evaluation of Coals containing from 2 to 3 per cent Sulphur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10. TON) CENTS	PRICE PER MILLION B. t. u. (AT \$1. TON) CENTS
134	5.3	-0.7	1.4	998.6	98.6	12950	25.91	38.56	3.81
162	6.3	0.3	0.6	1000.6	100.6	12550	25.10	39.86	4.01
189	7.7	1.7	3.4	1003.4	103.4	12900	25.8	38.8	4.07
204	8.9	2.9	5.8	1005.8	105.8	13220	25.44	38.04	4.00
205	8.4	2.4	4.8	1004.8	104.8	13160	26.32	38.18	3.98
219	4.8	-1.2	-2.4	997.6	97.6	13250	26.44	37.73	3.69
225	8.6	2.6	5.2	1005.2	105.2	13990	27.98	35.83	3.76
226	8.6	2.6	5.2	1005.2	105.2	14030	28.06	35.82	3.75
227	9.3	3.3	6.6	1006.6	106.6	13770	27.54	36.55	3.87
228	9.2	3.2	6.4	1006.4	106.4	11810	23.62	42.61	4.26

238
 162
 189
 154
 205
 204
 215
 227
 225
 226

LAB NO'S

COST IN DOLLARS PER TON

1 2 3 4 5 6 7 8 9 10

4

6

8

10

12

14

16

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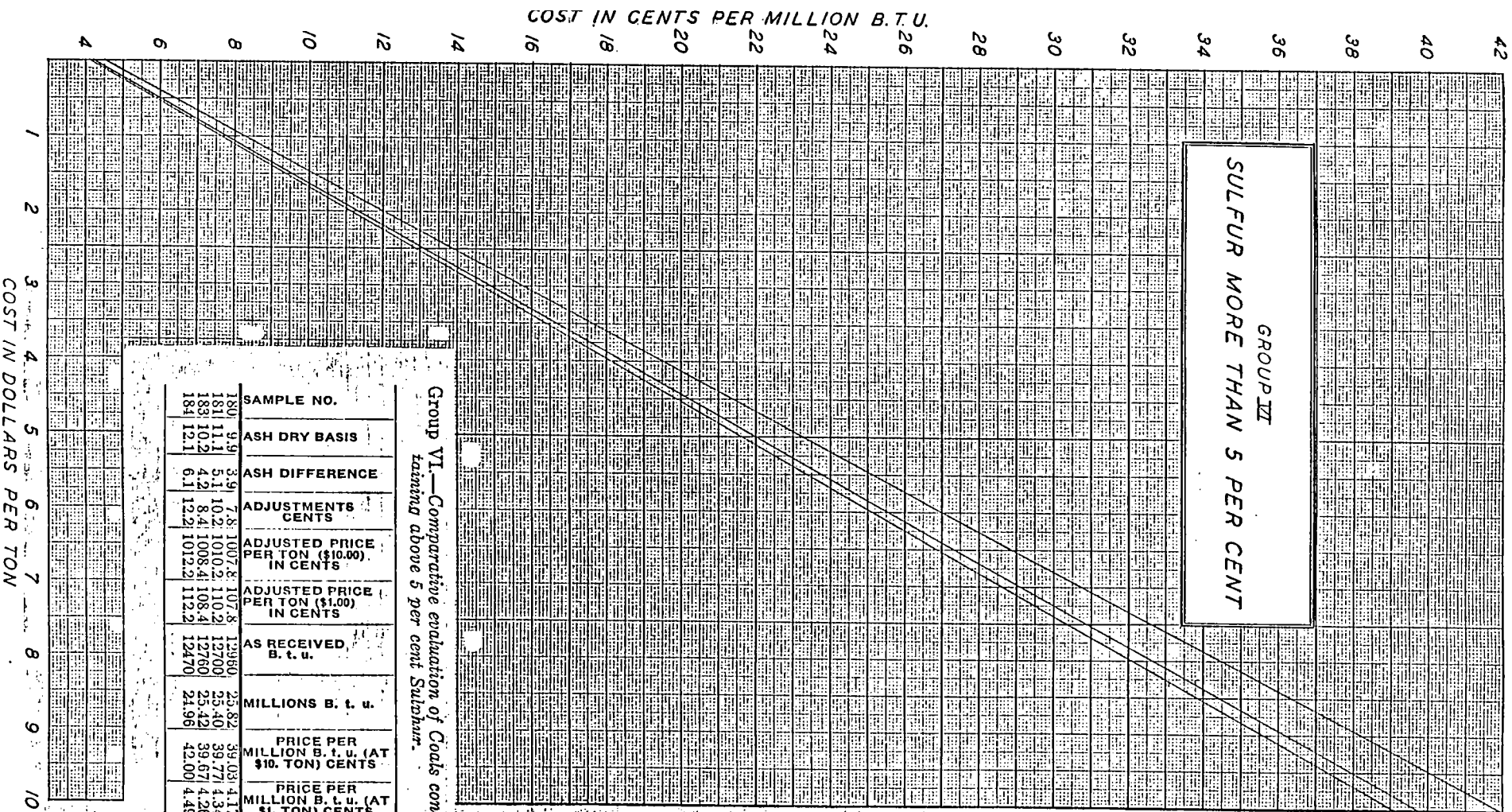
COST IN CENTS PER MILLION B.T.U.

GROUP II
SULFUR 3 TO 4 PER CENT INCLUSIVE

Group IV—Comparative evaluation of Coals containing from 3 to 4 per cent Sulphur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10. TON) CENTS	PRICE PER MILLION B. t. u. (AT \$1. TON) CENTS
156	9.1	3.1	6.2	1006.2	106.2	12479	23.92	38.77	4.09
157	8.8	2.8	5.6	1005.6	105.6	12350	24.70	40.71	4.27
158	7.7	1.7	3.4	1003.4	103.4	12510	25.02	40.10	4.13
101	8.3	2.3	4.6	1004.6	104.6	12570	25.14	39.96	4.16
171	8.6	2.6	5.2	1005.2	105.2	13780	27.56	36.47	3.82
172	9.1	3.1	6.2	1006.2	106.2	12480	24.96	40.31	4.25
174	9.1	3.1	6.2	1006.2	106.2	12620	25.24	39.86	4.21
175	7.8	1.8	3.6	1003.6	103.6	12730	23.50	39.35	4.06
216	10.0	4.0	8.0	1008.0	108.0	12400	24.80	40.64	4.33
223	9.3	3.3	6.6	1006.6	106.6	13880	27.40	36.26	3.84
224	10.4	4.4	8.8	1008.8	108.8	13700	27.40	36.81	3.97
229	11.3	5.3	10.6	1010.6	110.6	11370	22.74	44.44	4.86

LAB. NO'S.
229
157
216
172
158
161
174
175
156
224
171
223



LAB.
NO'S:
184
181
183
180

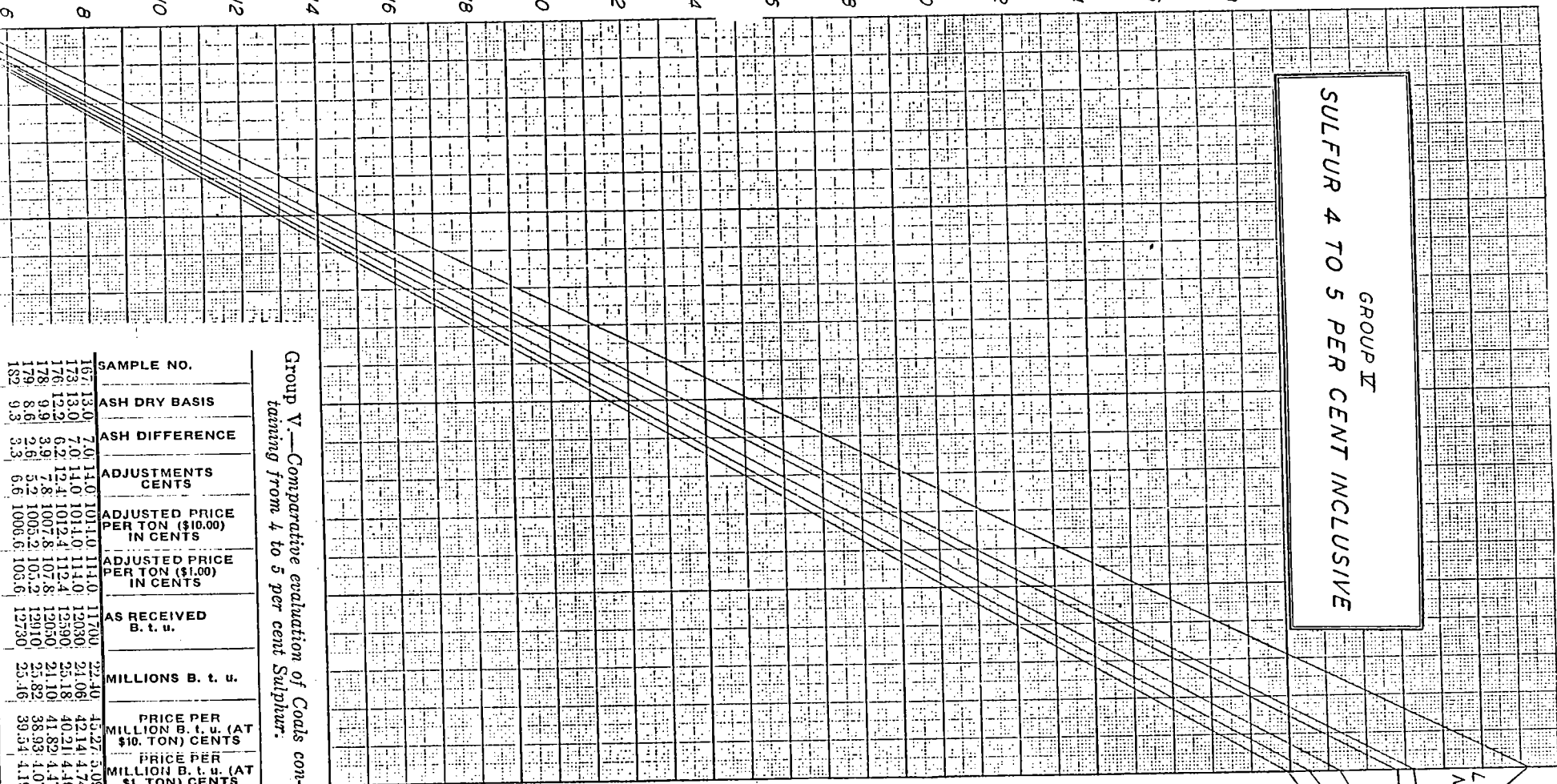
Group VI.—Comparative evaluation of Coals containing above 5 per cent Sulfur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10. TON) CENTS	PRICE PER MILLION B. t. u. (AT \$1. TON) CENTS
180	9.9	3.9	7.8	1007.8	107.8	12980	25.82	39.03	4.17
181	11.1	5.1	10.2	1010.2	110.2	12700	25.40	39.77	4.34
183	10.2	4.2	8.4	1008.4	108.4	12760	25.42	39.67	4.26
184	12.1	6.1	12.2	1012.2	112.2	12470	21.96	42.00	4.49

GROUP IV
SULFUR 4 TO 5 PER CENT INCLUSIVE

LAB. No.'s
167
173
178
176
182
179

COST IN CENTS PER MILLION B.T.U.



Group V.—Comparative evaluation of Coals containing from 4 to 5 per cent Sulphur.

SAMPLE NO.	ASH DRY BASIS	ASH DIFFERENCE	ADJUSTMENTS CENTS	ADJUSTED PRICE PER TON (\$10.00) IN CENTS	ADJUSTED PRICE PER TON (\$1.00) IN CENTS	AS RECEIVED B. t. u.	MILLIONS B. t. u.	PRICE PER MILLION B. t. u. (AT \$10. TON) CENTS	PRICE PER MILLION B. t. u. (AT \$1. TON) CENTS
167	13.0	7.0	14.0	101.0	114.0	11700	22.40	45.27	3.09
173	13.0	7.0	14.0	101.4	114.0	12030	24.06	42.14	4.74
176	12.2	6.2	12.4	101.2	112.4	12590	25.18	40.21	4.46
178	9.9	3.9	7.8	100.7	107.8	12710	21.10	41.82	4.47
179	8.6	2.6	5.2	100.3	107.2	12910	25.82	38.93	4.07
182	9.3	3.3	6.6	100.6	103.6	12730	23.46	39.34	4.19