

REPORT
INSPECTOR OF MINES
OF KENTUCKY

1905-6

ANNUAL REPORTS
OF THE
INSPECTOR OF MINES

OF THE
STATE OF KENTUCKY

FOR 1905 AND 1906

BY

C. J. NORWOOD, Chief Inspector

ASSISTANT INSPECTORS :

A. G. SPILLMAN, - - - Lexington

J. D. CAIN, - - - - - London

A. J. DOSS, - - - - Central City

HEAD OFFICE, LEXINGTON, KENTUCKY

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LETTER OF TRANSMITTAL.

To His Excellency, J. C. W. BECKHAM,
Governor of Kentucky.

Sir: I have the honor to submit herewith the report of this office covering the calendar years 1905 and 1906. Printing of the report for 1905 was so long delayed, in consequence of pressure for printing various other reports, that, since a summary of it had been submitted to you and published it was deemed better to re-arrange it and include it with that for 1906 than to now issue each report separately.

It seems well here to call your attention to the very gratifying rate at which the State is advancing, not only in the mining of coal, but in the production of fluorspar and barytes, with their associated lead and zinc ores. Kentucky is now not only the largest producer of ground fluorspar in the United States, but one of the largest producers of fluorite in the world; and the indications are, from present activities in the central part of the State, that it will soon become one of the most important producers of barytes. The State Geological Survey now has in the hands of the printer a bulletin, prepared by Mr. F. Julius Fohs, on the production and technology of fluorspar, in which the subject is treated very fully. Mr. Fohs has also prepared for this report, as he did for the 1904 report, full statistics relating to the production of that mineral.

Including those that produce fluorspar, barytes, and iron, together with those that produce commercial coal there are at present about forty-three counties in which commercial

mining is carried on; if to these be added those (exclusive of coal counties) in which clay is mined there are about forty-nine mining counties in the State, and the number will soon be increased to about fifty-seven. Twenty-six counties produced commercial coal in 1906.

I wish to here record acknowledgment of the services of Assistant Inspectors A. G. Spillman, J. D. Cain, and A. J. Doss in the work of enforcing the mining laws. Practically all the field work has necessarily fallen upon those gentlemen, and its arduousness has been increased by the necessity for inspecting miners' oil in addition to inspecting the mines. They have my thanks for the cordial and effective way in which they have co-operated in the work.

To you, sir, I offer unfeigned thanks for the advice and assistance you have given in the conduct of official affairs, and for the unvarying kindness with which you have treated me.

I have the honor to be

Your obedient servant,

CHARLES J. NORWOOD,

Chief Inspector of Mines, Etc.

State College of Kentucky,
Lexington, Ky.

I

MISCELLANEOUS.

The clerical work of the office, already large, is constantly increasing; so much so that the services of a regular clerk are really needed. At present the clerk of the Geological Survey assists the Inspector in the office work, but nevertheless it is difficult to keep up with the demands in the way of correspondence and routine duties. An assistant in the Inspector's college work is hoped for; if provided, matters will be simplified, and the Inspector will be in position to take a larger share in the field work, which is now performed nearly altogether by the Assistant Inspectors.

ADDITIONAL INSPECTORS.

In the reports for 1902 and 1904 attention was called to the urgent need for additional Assistant Inspectors. In compliance with the recommendation, the Legislature of 1906, passed an act providing for two additional ones.

The action of the Assembly was due to Senator M. G. Watson, of Lawrence county, and Representative C. C. Beard, of Ohio county. In their respective houses each gentleman offered a bill providing for additional Assistants, for the inspection of miners' oil, and for the inspection of mine scales. Senator Watson's measure was deemed the more acceptable, and when it reached the House was accepted by Mr. Beard in lieu of the one he had offered. It is but justice to Senator Watson to say that he performed the difficult and unusual feat of passing his bill through both houses in the very closing days of the session, when delays would have proved fatal and when to many success seemed impossible. Mr. Beard rendered efficient service in forwarding the passage of the measure through the House. To both gentlemen the miners of the State owe grateful consideration.

The act became a law in March, 1906, and Mr. A. J. Doss was appointed for the Western District and Mr. J. D. Cain for the Southeastern one. Under the law, the appointments were made by the Governor. Under provisions of the law, the counties allotted to each Assistant were as follows:

To Mr. A. G. Spillman the following: Christian, Hopkins and Webster counties in the Western District; and all the counties of the Northeastern District, namely, Boyd, Breathitt, Carter, Floyd, Johnson, Lawrence, Lee, Morgan and Pike; having a total of sixty-one companies and eighty-eight mines. Thirty-nine of the companies and fifty-two of the mines are in the Northeastern District.

To Mr. A. J. Doss the following: Butler, Daviess, Hancock, Henderson, McLean, Muhlenberg, Ohio and Union, having a total of sixty companies and sixty-eight mines, in the Western District. The district under the supervision of Mr. Doss is compact and readily worked, in consequence of easy facilities for reaching all the mines.

To Mr. J. D. Cain the following: Bell, Knox, Laurel, Pulaski, Rockcastle, and Whitley counties, having eighty-one companies and 123 mines. The district of Mr. Cain is fairly compact, but it contains an exceedingly large number of mines for one man to look after, and many of them are difficult to reach.

It is evident that it is impossible for all of the mines to receive three inspections each year, especially since the Assistants are required to inspect miners' oil and test mine scales in addition to inspecting the mines. A fourth Assistant is needed; with such an addition to the inspection force, the office will be prepared to take proper care of all the mines for several years to come, unless there is a larger increase in the number of mines within a short period than is anticipated.

INSPECTION OF MINERS' OIL.

In the report for 1904 attention was called to the necessity for a law to provide for a better quality of miners' oil than was being sold in the State. Such a law was enacted by the Legislature of 1906, and the inspection of the oil was placed upon this office. This work has been found to be very burdensome, and to materially interfere with the inspection of the

mines. The appointment of a fourth Assistant would give much relief in this respect, but it is believed that were the Chief Inspector empowered to delegate oil inspections, when necessary, to the Coal Oil Inspectors of the various counties in which miners' oil is sent, it would be the better way to handle the work.

That the oil law has proved beneficial is beyond question. In the earlier efforts to enforce the law, temporary dependence was placed on the specific gravity test. It soon became manifest, however, that the gravity test is of little value alone, and thereafter such test was relegated to its proper position and reliance placed on the smoke test. Since the application of the smoke test, the grade of oils generally used has been greatly improved.

INSPECTION OF SCALES.

The Legislature of 1906 also enacted a law requiring that when question arises between coal companies and their employes as to the accuracy of the mine scales, the matter shall be referred to the Chief Inspector of Mines, who in person or by deputy shall test the scales. A number of requests for the inspection of mine scales have been made and complied with during the past year, and it is believed that the law has proved beneficial.

INSTRUCTIONS TO ASSISTANTS.

On June 1st, 1906, shortly after the appointment of the two additional Assistants, the following instructions were issued to each Assistant by the Chief Inspector:

1. Until further notice, Assistant Inspectors are assigned to work in the various coal mining counties as hereinafter named. Each Assistant will keep in close touch with the several mines in his charge, making not less than three inspections per annum of each mine, and as many more as it is possible for him to make when observing all diligence. Every effort must be made to have the mines kept in good condition.

2. Each Assistant will make monthly reports to the Chief Inspector. In his report he will name the mines he has inspected (naming them in the order in which they have been visited), state briefly the condition of each (referring at the

same time to the serial number of the Inspection Notice served in each case), and give an account of his proceedings generally. Note is to be made of all mines that were visited but not inspected, and the reason for not making an inspection is to be given. Monthly reports should be sent in within a week after the close of each month. A copy of each Inspection Notice served is to be sent with each report, and a duplicate copy must be retained by Assistant. Copies of the Notices must, in wording, be exact copies of the original.

3. Inspection Notices must be numbered consecutively, beginning with 1, and the initial of the surname of the Assistant must follow the number. No more than one mine is to be covered by any one Notice, and Notices are to be given when mines are found in good condition (simply stating that fact), as well as when they are defective. When a mine is found in defective condition, the Notice served on the operator must state explicitly and in detail what the defects consist of and where located, and what should be done to remedy them. Trivial defects, while they may be noted, should not be magnified, and Assistants are expected to use such wisdom and discretion in dealing with the mines as should pertain to them as trained mining men.

4. The Assistant Inspectors are to be careful to base their actions on what they themselves see, and not in any way upon what they may be told either by bank-bosses or miners, though they are to give due consideration to all explanations that may be offered. While they are to perform their duties without fear or favor, doing impartial justice to all, they are expected to be courteous in their dealings with all concerned, allowing neither personal friendships nor personal antagonisms (if any there be) to interfere with their official relations. They will remember that they have naught to do with the business affairs of any coal mining company, and take care not to bring odium upon themselves, or this office into disrepute, by any action that can be called meddling; such has been the policy of this office from the beginning, and it is only by continued observance of it that the confidence of both miners and operators can be retained.

5. At the conclusion of each monthly report all mines that have been opened since the last report should be noted,

with all particulars concerning them that can be obtained (including names of companies and officials). Mines that have been shut down should also be noted, giving the date and reason for suspension, and whether permanent or temporary.

6. The inspection of miners' oil will begin October 1st. In consequence of lack of apparatus, and the various circumstances attending the matter, it can not begin sooner. In the meantime, Assistants will collect samples of the oil at present used (an 8-ounce or 6-ounce bottle of each sample), in order that it may be seen what effect the provisions of the law may have in improving the grade of oil used. Standard weights for testing mine scales will be supplied Assistants as soon as they can be obtained. Means for testing for fire-damp will also be supplied.

7. Following are the counties to which each Assistant is assigned for the present:

A. G. Spillman will inspect the mines in the following counties:

Counties.	Number of Companies.
1. Christian -----	1 or more
2. Hopkins -----	11 or more
3. Webster -----	9
4. Boyd -----	3 or more
5. Carter -----	6
6. Breathitt -----	1 or more
7. Johnson -----	5
8. Floyd -----	1
9. Lawrence -----	2
10. Lee -----	4
11. Morgan -----	5
12. Pike -----	3 or more
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A. J. Doss will inspect the mines in the following counties:

Counties.	Number of Companies.
1. Butler -----	2, probably more
2. Daviess -----	5
3. Hancock -----	1, probably more
4. Henderson -----	10 or more
5. McLean -----	2
6. Muhlenberg -----	14 or more
7. Ohio -----	9 or more
8. Union -----	9
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J. D. Cain will inspect the mines in the following counties:

Counties.	Number of Companies.
1. Bell -----	16 or more
2. Knox -----	10 or more
3. Laurel -----	12
4. Pulaski -----	6
5. Rockcastle -----	2
6. Whitley -----	23 or more
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Such changes and transfers as necessity may call for will be made from time to time. In order that an adequate number of inspections may be made before the end of the year, and mines which have fallen into bad condition in consequence of insufficient attention be brought up to the proper standard, diligence and hard work will be required, and this the Chief Inspector does not doubt will be given. With best wishes for the success of each Assistant, I am, respectfully, C. J. Norwood, Chief Inspector of Mines, etc.

As has been indicated, before the end of the year the number of companies whose mines were under supervision by the respective Assistants exceeded the number stated in the instructions.

STATE GEOLOGICAL DEPARTMENT.

The usual large amount of correspondence touching the resources of the State has been carried on and many reports and maps have been distributed. Samples of minerals of various sorts, some of value and some of little or no importance, are continually received, and written opinions are given concerning them. One of the gratifying facts, demonstrated by the character of samples sent for examination no less than by the nature of inquiries received, is the interest manifested in the clays of the State. Many free analyses and assays have been made, but it has not been possible to comply with all requests for such work. It is believed that a charge sufficient to at least cover the cost of making analyses and assays should be required. The work of the Geological Survey has been vigorously prosecuted, the details of which will be given in the biennial report concerning the progress of the Survey. Seven geological reports have been issued and about as many more are ready for the printer.

GENERAL CONDITIONS OF THE MINES.

Although Kentucky continues in the front rank of those coal mining States which have the lowest fatality rates, there are too many fatal accidents in our mines; there are too many deaths caused by fall of roof. Following were the fatalities for 1905 and 1906:

FATALITIES FOR 1905.

In the production of 8,039,246 tons of coal put out this year, 31 lives were lost, 28 of them underground. Following is a statement of the causes and number of deaths due to each cause:

Cause.	Persons killed.
Fall of roof-----	20
Caught by mine cars-----	2
Powder explosion-----	5
Premature blast-----	1
Total inside-----	28
Miscellaneous, outside-----	3
Total-----	31

For each fatal accident inside 287,116 tons of coal were produced. For each 1,000 persons employed inside 2,334 lives were lost underground. For each death from roof fall 401,962 tons of coal were produced.

FATALITIES FOR 1906.

In the production of coal forty lives were lost. Six of the fatalities occurred on the surface, five in shafts, and twenty-nine underground.

The deaths due to accidents in the mines, and the causes, were as follows:

Cause.	Number killed.
Fall of roof-----	18
Fall of coal-----	2
Fall of side-----	1
Caught by mine cars-----	2
Caught by shot-----	1
Dust explosion—windy shot-----	2
Burned by powder-----	1
Burned by gas-----	1
Touched trolley wire-----	1
Total inside mine-----	29

The deaths in shafts were as follows:

Cause.	Number killed.
Fell down shaft-----	2
Fell to bottom while working on cage-----	1
Fell from ascending cage-----	1
Struck by falling lump of coal-----	1
Total in shafts-----	5

Deaths caused by accidents on the surface were as follows:

Cause.	Number killed.
Fell off roof of tippie-----	1
On tippie—struck by monitor-----	1
On tippie—struck by car-----	1
Top of incline—jumped on moving car-----	1
On incline—fell through trestle-----	1
Opening keg of powder-----	1
Totail on surface-----	6

For each fatal accident inside the mine 330,983 tons of coal were produced. For each death in mine and shaft combined 282,309 tons (equal to 7,058 forty-ton railroad cars of coal) were mined. For each 1,000 persons employed inside, 2.24 lives were lost underground. The deaths underground, in shaft and on surface combined were 2.33 for each 1,000 persons employed in and out; this did not quite equal the rate for inside deaths and persons alone in 1905. For each death from roof fall 533,252 tons of coal were mined, being an increase of 131,290 tons over 1905. Considering only the fatal and serious accidents—since the “non-serious” includes so many that are little more than trivial—and combining accidents in shafts with those that occurred within the mines, it appears that for 1906 there were 25 more such accidents than in 1905, consisting of an increase of 6 in the fatal and of 19 in the non-fatal injuries. Since the increase in the coal production amounted to 1,559,283 tons, such increase in casualties might be regarded as not excessive, but the writer considers the increase entirely too large, and he urges upon both miner and operator the necessity for greater care in the mines. Operators can do much toward diminishing the accident rate by insisting upon the strict observance of good rules; by prohibiting certain dangerous practices, such as drilling out missed shots, the

carrying into the mine of blasting powder in kegs, the opening of a keg of powder with a pick, and the use of iron or steel tamping bars and needles. The miner can do much by exhibiting a more intelligent regard for rules that are established for his welfare, by exhibiting less carelessness in the matter of setting props at once when needed, by taking fewer chances with a loose roof, and by manifesting a greater appreciation of the dangers which are associated with his avocation.

Notwithstanding the increase in total fatal and serious accidents, however, it must be said that the record for 1906 was better than that for 1905, and for this, no doubt, the appointment of two additional Assistant Inspectors is largely responsible. This betterment of the record is shown in the greater tonnage of coal produced per fatal inside accident, by the decrease in the inside death rate per 1,000 persons employed inside, and by the increase of tonnage raised per death from roof fall. It is especially gratifying to note that there was no increase in the number of deaths from falls of top, notwithstanding the increase of output, and that the number of serious accidents from such cause shows an increase of only four.

Upon the whole, therefore, having in mind the large increase in tonnage, it may be said that the mines were kept in materially better condition in 1906 than in 1905. The additional Assistants did not get to work until about the middle of May; it may be hoped, therefore, that since they have become more familiar with the characteristics of the individual mines as good a showing may be made for the year 1907.

II

COMMERCIAL MINES.

At the close of the year 1906 there were in operation 279 mines, operated by 202 companies. This is a net increase of 77 mines and 50 companies within the last two years. Since 1902 there has been a net increase of 141 mines and 99 companies. Judging from the number of companies that have been formed and working plans that are known to have been laid, the year 1907 will witness a further increase, and we may expect that within the next four years there will be in operation somewhere near 500 mines.

The following list shows the names of the operators and of the counties in which the mines are situated, as on March 1, 1907, and the postoffice address of each mine. In some instances the principal office is not at the mine; the address of that office will be found under the name of the mine or company in the chapter headed "Notes on the Mines."

GENERAL LIST OF MINES.

Name of Operator.	Mine Office.	County.	No. of Mines.
Bell Jellico Coal Co.	Bell Jellico ----	Bell -----	1
Big Hill Coal Co.	Blanche -----	Bell -----	2
Black Raven Coal Co.	Fourmile -----	Bell -----	1
Blue Gem Coal Co.	Flatlick -----	Bell -----	1
Clear Fork Coal and Coke Co.	Middlesboro ----	Bell -----	1
Coleman Mining Co.	Cary -----	Bell -----	1
Columbia Coal Co.	Middlesboro ----	Bell -----	1
East Jellico Coal Co.	Bell Jellico ----	Bell -----	1

GENERAL LIST OF MINES—Continued.

Name of Operator.	Mine Office.	County.	No. of Mines.
Edw. Blake, Lessee Black Bear Coal Co.	Fourmile -----	Bell -----	1
Excelsior Coal Mining Co. -----	Excelsior -----	Bell -----	1
Fern Lake Coal Co. -----	Middlesboro ---	Bell -----	1
Highland Rim Coal Co. -----	Fourmile -----	Bell -----	3
Luke and Drummond Coal Co. -----	Logmont -----	Bell -----	2
Sagamore Coal Co. -----	Logmont -----	Bell -----	1
Shamrock Coal Co. -----	Shamrock -----	Bell -----	1
St. Clair Coal and Coke Co. -----	Middlesboro ---	Bell -----	1
Stony Fork Coal Co. -----	Middiesboro ---	Bell -----	3
Straight Creek Coal and Coke Co. -----	Straight Creek..	Bell -----	2
Straight Creek Coal Mining Co. -----	Cary -----	Bell -----	1
Turner Coal Co. -----	Middlesboro ---	Bell -----	1
Wallsend Coal & Coke Co. -----	Wallsend -----	Bell -----	3
Winona Coal & Coke Co. -----	Middlesboro ---	Bell -----	2
Ashland Iron & Mining Co. -----	Rush' -----	Boyd -----	1
Geo. L. Hull -----	Rush -----	Boyd -----	1
John Wurts, Lessee -----	Ashland -----	Boyd -----	1
Princess Land & Mining Co. -----	Princess -----	Boyd -----	1
Kentucky Union Co. -----	Jackson -----	Breathitt ---	2
Aberdeen Coal & Mining Co. -----	Aberdeen -----	Butler -----	1
Ben Topmiller, Sr. -----	Morgantown ---	Butler -----	1
Morgantown C. & M. Co. -----	Morgantown ---	Butler -----	1
Adkins Coal Co. -----	Mt. Sterling ---	Carter -----	1
Dawson Branch Mine -----	Rush -----	Carter -----	1
J. Bates, Lessee -----	Ashland -----	Carter -----	3
Eastern Kentucky Railway Co. -----	Riverton -----	Carter -----	1

GENERAL LIST OF MINES—Continued.

Name of Operator.	Mine Office.	County.	No. of Mines.
Cumberland Coal Co. -----	Warren -----	Knox -----	2
Hughes Jellico Coal Co. -----	Flatlick -----	Knox -----	1
Ingles Coal Co. -----	Hujel -----	Knox -----	1
J. T. Gray -----	Gray -----	Knox -----	2
Lynn Camp Coal Co. -----	Gray -----	Knox -----	2
Mathews Jellico Coal Co. -----	Hujel -----	Knox -----	1
North Jellico Coal Co. -----	Bertha -----	Knox -----	2
North Jellico Coal Co. -----	Wilton -----	Knox -----	2
North Point Jellico Coal Co. -----	Gray -----	Knox -----	1
Richland Jellico Coal Co. -----	Bailey's Switch -----	Knox -----	1
Rossland Coal Co. -----	Rossland -----	Knox -----	2
G. W. Curvin -----	Viva -----	Laurel -----	2
Lily Jellico Coal Co. -----	Lily -----	Laurel -----	1
New Altamont Coal Co. -----	Altamont -----	Laurel -----	1
New Laurel Coal Co. -----	Pittsburg -----	Laurel -----	2
New Victoria Coal Co. -----	Pittsburg -----	Laurel -----	1
Perry Cole -----	Pittsburg -----	Laurel -----	1
Phenix Jellico Coal Co. -----	Altamont -----	Laurel -----	4
Pittsburg Coal Co. -----	Pittsburg -----	Laurel -----	2
Pitman Coal Co. -----	Pittsburg -----	Laurel -----	1
Star Coal Co. -----	East Bernstadt -----	Laurel -----	1
S. W. Rockwell -----	Pittsburg -----	Laurel -----	1
Wm. Dunavent -----	Pittsburg -----	Laurel -----	1
Peach Orchard Coal Co. -----	Peach Orchard -----	Lawrence -----	2
Torchlight Coal Co. -----	Louisa -----	Lawrence -----	2
Beattyville Block Coal Co. -----	Beattyville -----	Lee -----	1

GENERAL LIST OF MINES—Continued.

Name of Operator.	Mine Office.	County.	No. of Mines.
J. C. Richardson Coal Co. -----	Beattyville -----	Lee -----	1
McGuire Coal Co. -----	Beattyville -----	Lee -----	1
South Fork Coal Co. -----	Beattyville -----	Lee -----	1
Alva Karnes -----	Island -----	McLean -----	1
Green River Coal & Coke Co. -----	Island -----	McLean -----	1
Green River Coal Co. -----	Livermore -----	McLean -----	1
Memphis Coal Co. -----	Island -----	McLean -----	1
Caney Cannel Coal Co. (Watson) -----	Caney -----	Morgan -----	1
Kentucky Block Cannel Coal Co. -----	Cannel City -----	Morgan -----	3
Mayflower Cannel Coal Co. -----	Caney -----	Morgan -----	1
White Oak Cannel Coal Co. -----	Piedmont -----	Morgan -----	1
Beech Creek Coal Co. -----	Browder -----	Muhlenberg -----	1
Bevier Coal Co. -----	Cleaton -----	Muhlenberg -----	1
Black Diamond Coal & Mining Co. -----	Drakesboro -----	Muhlenberg -----	1
Brown-Lam Coal Co. -----	Hillside -----	Muhlenberg -----	1
Central Coal & Iron Co. -----	Central City -----	Muhlenberg -----	1
Crescent Coal Co. -----	Bevier -----	Muhlenberg -----	1
Dovey Coal Co. -----	Hillside -----	Muhlenberg -----	1
Elk Valley Coal Co. -----	Drakesboro -----	Muhlenberg -----	1
Greenville Coal Co. -----	Powderly -----	Muhlenberg -----	1
Hillside Coal Co. -----	Hillside -----	Muhlenberg -----	2
Holt Coal Co. -----	Central City -----	Muhlenberg -----	1
Lam Coal Co. -----	Bevier -----	Muhlenberg -----	1
Louisville-Atlanta Coal Co. -----	Drakesboro -----	Muhlenberg -----	1
Oakland Coal Co. -----	Greenville -----	Muhlenberg -----	1
R. Morgan Coal Co. -----	Central City -----	Muhlenberg -----	1

GENERAL LIST OF MINES—Continued.

Name of Operator.	Mine Office.	County.	No. of Mines.
Tade Foley -----	South Carrollton	Muhlenberg -	1
W. A. Wickliffe Coal Co. -----	Browder -----	Muhlenberg -	1
W. G. Durcan Coal Co. -----	Luzerne -----	Muhlenberg -	3
Broadway Coal Mining Co. -----	McHenry -----	Ohio -----	1
Central Coal & Iron Co. -----	Render -----	Ohio -----	1
Deaneffield Coal Co. -----	Aetnaville -----	Ohio -----	2
Fordsville Block Coal Co. -----	Fordsville -----	Ohio -----	1
Green River Coal Mining Co. -----	Coffman -----	Ohio -----	1
McHenry Coal Co. -----	McHenry -----	Ohio -----	2
Peacock Coal Co. -----	Reynolds -----	Ohio -----	1
Taylor Coal Co. of Ky. -----	Taylor Mines ---	Ohio -----	2
Williams Coal Co. -----	McHenry -----	Ohio -----	1
Borderland Coal Co. -----	Borderl'd, W Va	Pike -----	2
Edgewater Coal & Coke Co. -----	Hellier -----	Pike -----	1
Freeburn Coal & Coke Co. -----	Edgarton, W Va	Pike -----	1
Greenough Coal & Coke Co. -----	Hellier -----	Pike -----	1
Henry Clay Coal & Coke Co. -----	Lookout -----	Pike -----	2
Marrowbone Coal & Coke Co. -----	Lookout -----	Pike -----	2
Pike Coal & Coke Co. -----	Hellier -----	Pike -----	1
Pike Collieries Co. -----	Matewan, W Va	Pike -----	2
Thacker Coal Mining Co. -----	Thacker, W Va	Pike -----	1
Vulcan Coal Co. -----	Vulcan, W. Va.	Pike -----	2
Alpine Coal Co. -----	Alpine -----	Pulaski -----	1
Eagle Coal Co. -----	Barrenfork -----	Pulaski -----	3
Indian Head Coal Co. -----	Parkers Lake ---	Pulaski -----	1
Mahoning Coal Co. -----	Parkers Lake ---	Pulaski -----	1

GENERAL LIST OF MINES—CONTINUED.

Name of Operator.	Mine Office.	County.	No. of Mines.
New Cumberland Coal Co. -----	McGuffey -----	Pulaski -----	2
Peters & Souleyret -----	Flatrock -----	Pulaski -----	1
New Livingston Coal Co. -----	Livingston -----	Rockcastle -----	2
Bell Union Coal & Coke Co. -----	Sturgis -----	Union -----	1
B. C. Davidson & Sons -----	Uniontown -----	Union -----	1
Crittenden Coal Co. -----	Marion -----	Union -----	1
Morganfield Coal & Mining Co. -----	Morganfield -----	Union -----	1
Ohio Valley Coal & Mining Co. -----	DeKoven -----	Union -----	1
Southern Tidewater Coaling Co. -----	Uniontown -----	Union -----	1
Sullivan Coal Co. -----	Sullivan -----	Union -----	1
Thomas Coal Co. -----	Morganfield -----	Union -----	1
Waverly Coal Co. -----	Waverly -----	Union -----	1
West Kentucky Coal Co. -----	Sturgis -----	Union -----	2
Fairmont Coal Mining Co. -----	Providence -----	Webster -----	1
L. Wright -----	Providence -----	Webster -----	1
Providence Coal Co. -----	Providence -----	Webster -----	2
R. L. Forsythe -----	Providence -----	Webster -----	1
S. K. Luton -----	Providence -----	Webster -----	1
Sebree Coal Co. -----	Sebree -----	Webster -----	1
St. Bernard Mining Co. (Shamrock) -----	Earlington -----	Webster -----	1
Thos. Blackwell Coal Mining Co. -----	Clay -----	Webster -----	1
Thos. Wanless -----	Providence -----	Webster -----	1
Webster County Coal Co. -----	Providence -----	Webster -----	1
West Kentucky Coal Co. -----	Wheatcroft -----	Webster -----	3
Williams & Patterson -----	Wheatcroft -----	Webster -----	1
Anderson Coal Co. -----	Halsey -----	Whitley -----	1

GENERAL LIST OF MINES—CONTINUED.

Name of Operator.	Mine Office.	County.	No. of Mines.
Burk Hollow Coal Co. -----	Jellico, Tenn. --	Whitley -----	2
Campbell Coal Mining Co. -----	Coalmont -----	Whitley -----	1
Cooke Jellico Coal Co. -----	Jellico, Tenn.	Whitley -----	1
Dowlais Blue Gem Coal Co. -----	Jellico, Tenn.	Whitley -----	2
East Tennessee Coal Co. -----	Jellico, Tenn.	Whitley -----	2
Elite Coal Co. -----	Jellico, Tenn. --	Whitley -----	2
French Coal Co. -----	Halsey -----	Whitley -----	1
Imperial Jellico Coal Co. -----	Rockhold -----	Whitley -----	1
Jellico Coal Mining Co. -----	Mountain Ash --	Whitley -----	1
Jellico Mining Co. -----	Saxton -----	Whitley -----	2
Jas. Rogers Blue Gem Mine -----	Jellico, Tenn.	Whitley -----	1
Louisville Property Co. -----	Halsey -----	Whitley -----	2
Main Jellico Mtn. Coal Co. -----	Kensee -----	Whitley -----	3
Mt. Morgan Coal Co. -----	Williamsburg --	Whitley -----	2
Pleasant View Jellico Coal Co. -----	Pleasant View --	Whitley -----	2
Pocono Coal Co. -----	Williamsburg --	Whitley -----	1
Procter Coal Co. -----	Red Ash -----	Whitley -----	2
S. A. Wender -----	Jellico, Tenn.	Whitley -----	1
Stearns Coal Co. -----	Stearns -----	Whitley -----	5
Sunbeam Coal Co. -----	Jellico, Tenn. --	Whitley -----	1
Watts Creek Jellico Coal Co. -----	Wofford -----	Whitley -----	1
Wender Blue Gem Coal Co. -----	Halsey -----	Whitley -----	1
West Jellico Coal Co. -----	Strunk -----	Whitley -----	1

III

STATISTICS FOR 1905 AND 1906.

There are 47 coal counties, exclusive of those that have only small pockets or outliers of coal, or an inconsiderable fringe of either field. At least 39 of the counties are capable of maintaining a large annual production for very many years, but only 26 of them are producing commercial coal at this time.

For convenience and because of trade relations, those counties having mines subject to inspection are at present grouped in three districts, according to each one's relation, namely, the Western, the Southeastern, and the Northeastern. The Western District includes all counties that lie within the Western Coal Field. The Southeastern at present includes Bell, Knox, Laurel, Pulaski, Rockcastle, and Whitley counties. In the Northeastern are at present included Boyd, Breathitt, Carter, Floyd, Johnson, Lawrence, Lee, Morgan, and Pike counties. Other counties in the Eastern Field will be assigned to their proper districts as they enter the commercial list. Morgan county became a commercial producer in 1900. Pike county entered the list late in 1903; Floyd entered it in 1906. It is probable that Wolfe county and possibly Menifee will enter the list in 1907 or 1908.

PRODUCTION OF COAL.

In the production of coal the State has advanced rapidly. Within the last eleven years, the growth in output and in number of operating companies being especially marked since 1900. From 1896 to 1900 the number of companies operating annually ranged between 90 and 100 and the average annual output for the period was 3,633,775 tons. For the following four years the average annual rate of production was 5,998,264 tons. And for the past three years the average rate was 8,268,366 tons. From an output of 3,183,478 tons in 1896 the produc-

tion grew to 5,020,675 tons in 1900, showing an increase of 57.71 per cent.; and from that it advanced to 9,598,529 tons in 1906, showing an increase of 90.18 per cent. over 1900. The increase of tonnage for the last five years has been especially notable, being about double that for the preceding five years. The increase alone for 1906 over 1896 is more than double the total output for 1896; and it is more than a million tons in excess of the total output for the year 1899. The number of operating companies has increased from 91, working 123 mines, in 1900, to 207, operating 277 mines in 1906, and there will be a further large increase in the companies during 1907. This rate of progress fine as it is, but faintly indicates what may be expected within the next few years should present favorable conditions continue.

With respect to the State statistics, it may be well to explain that since it is the amount of commercial coal produced that mining, manufacturing and transportation interests and developing investors are interested in, the statistics given in this report refer exclusively to the commercial product, hence our totals are always less than those presented by Federal bureaus which endeavor to include the output of all "mines," whether large collieries or simply small diggings for family purposes.

The output, in short tons, by districts, for the last two years is as follows:

District.	1905.	1906.
Western -----	4,682,057	5,788,491
Southeastern -----	2,779,559	2,994,635
Northeastern -----	577,630	815,403
Total -----	8,039,246	9,598,529

But for deficiencies in car service, especially for the Southeastern district, the output for 1906 would probably have reached 10,000,000 tons.

COMMENTS ON RETURNS FOR 1905.

The figures for 1905 show an increase of 871,922 tons over the output for 1904. This is the more significant in view of the fact that the output for 1904 was 30,927 tons less than that for 1903. The gains and losses of the three districts in 1905, as compared with 1904, were as follows:

District.	Tons
Western, gain for 1905 -----	560,493
Southeastern gain -----	348,434
Total gain -----	908,927
Northeastern loss for 1905 -----	37,005
Net gain -----	871,922

In 1904 the Western district showed a loss of 123,218 tons as compared with 1903, and the Northeastern one showed a loss of 191,808 tons, while the Southeastern district showed a gain of 284,999 tons. The gains and losses of the three districts, therefore, compared with 1903, have been as follows:

District.	Tons
Western, net gain -----	437,275
Southeastern, total gain -----	632,533
Total gain -----	1,069,808
Northeastern, total loss -----	228,813
Net gain for 1905 since 1903 -----	840,995

The decrease in the Northeastern district for 1905 was almost entirely due to losses in Boyd and Carter counties. Those counties, formerly the most important in the production of coal in the Northeastern district, are now tending to the least important place. The production of Boyd has fallen from 249,731 tons in 1902 to 47,533 in 1905, and 50,897 in 1906; and that of Carter has fallen from 285,079 tons in 1902, to 121,161 in 1905, increasing, however, to 164,020 in 1906. Boyd and Carter not being considered, the production of the district is increasing rapidly. Pike county, which entered the commercial list in the latter part of 1903 with a very small tonnage, increased its output to 103,362 tons in 1905, which, however, is merely a hint of what may be expected in a short time; many mines now opened in the county but not fully equipped will become large producers. Floyd county entered the list during 1905, and with the Southward extension of the Lexington & Eastern railroad, which appears to be assured for the near future, at least as far as the vicinity of Hazard, Perry

county will become an important contributor of commercial coal, while the output of Breathitt will be increased.

COMMENTS ON RETURNS FOR 1906.

The figures for 1906 show an increase of 1,559,283 tons over the output for 1905. Following were the gains by districts:

	Tons.
Western district -----	1,106,434
Southeastern district -----	215,076
Northeastern district -----	237,773
Total Gain -----	1,559,283

The gains in the Western and Northeasten districts are particularly noteworthy. The increase in the former is almost double the gain made by the district for 1905 over 1904; while in the Northeastern one a loss of 37,005 in 1905 as compared with 1904 is replaced by a considerable gain in 1906. In the latter district Floyd county entered the list of commercial producers for the first time. Pike county more than doubled its production for 1905.

The gains for 1906 over 1905 in bituminous coal alone (i. e., excluding cannel from each year's output) were as follows:

	Tons.
Western district gain -----	1,106,434
Southeastern district -----	215,423
Northeastern district -----	260,871
Total -----	1,582,728

DISPOSITION OF THE PRODUCT.

The output in tons of the several districts was disposed of as follows:

For Calendar Year 1905.

DISTRICT.	Sold Locally.	Used at Mine.	Coked.	Shipped.	Total Product.
Western -----	197,180	134,549	108,070	4,242,258	4,682,057
Southeastern -----	49,459	50,577	35,743	2,643,600	2,779,559
Northeastern -----	6,672	12,001	2,088	556,869	577,630
Totals -----	253,311	197,307	145,901	7,442,727	8,039,246

For Calendar Year 1906.

DISTRICT.	Sold Locally.	Used at Mine.	Coked.	Shipped.	Total Product.
Western -----	233,163	179,284	99,266	5,276,778	5,788,491
Southeastern -----	46,366	52,972	36,257	2,859,040	2,994,635
Northeastern -----	14,963	14,460	-----	785,980	815,403
Totals -----	294,492	246,716	135,623	8,921,798	9,598,529

It will be observed that there was an increase of 1,479,071 tons in the amount of coal shipped from the mines in 1906 over that for the year 1905. The increase over 1904 was 2,307,648 tons.

TONNAGE SHIPPED TO OTHER STATES.

The percentage of the coal shipped from the mines that goes to other States has increased from 44.73 in 1904 and 52.82 in 1905 to 56.05 in 1906. The actual tonnages shipped to other States in the respective years were as follows: In 1904, 3,216,173 tons; in 1905, 3,932,656 tons; in 1906, 5,001,440 tons. The demand for home consumption also shows a substantial increase, though far from what it should be. The actual amounts that were shipped from the mines for home consumption were as follows: In 1904, 3,451,749 tons; in 1905, 3,510,-

071 tons; in 1906, 3, 920, 358 tons.

Omitting the coal that is consumed at and near the mines (for steam, for ventilation, and by local trade) and that converted into coke at the mines, and dealing only with the tonnage shipped from the mines, it is found that the percentages of the shipments which go to other States are as follows:

Calendar Years 1905 and 1906.

DISTRICT.	1905.			1906.		
	Shipped from the Mines.	Tons to Other States.	Per Cent. to Other States.	Shipped from the Mines.	Tons to Other States.	Per Cent. to Other States.
Western -----	4,242,258	2,820,726	66.49	5,276,778	3,327,183	63.05
Southeastern ----	2,643,600	969,840	36.68	2,859,040	1,300,156	45.47
Northeastern ----	556,869	142,090	25.51	785,980	374,101	47.59
Totals -----	7,442,727	3,932,656	52.82	8,921,798	5,001,440	56.05

SELLING VALUE OF PRODUCT 1905 AND 1906.

The total selling value at the mines of all commercial coal (bituminous and cannel*) for 1905 was \$7,810,829, yielding an average of 97.15 cents per ton. The average value of the cannel alone was \$2.4471 per ton at the mine; that of the bituminous alone was 95.51 cents per ton.

For the year 1906 the total selling value of the commercial coal was \$9,734,878. The average value of the cannel alone was \$2.4027 per ton; and that of the bituminous alone was \$1.0047 per ton. The figures show a decrease in the value of the cannel, compared with 1905, amounting to 4.44 cents per ton, and an increase in the selling value of the bituminous amounting to 4.96 cents.

VALUE OF BITUMINOUS FOR 1905.

The spot value per ton of the bituminous product alone in 1905 for each district was as follows:

DISTRICT.	Tons of Bituminous Product.	Total Value.	Average Value.
Western -----	4,682,057	\$4,021,859	\$0.8589
Southeastern -----	2,777,253	3,092,295	1.1134
Northeastern -----	491,520	480,309	0.9772
Total -----	7,950,830	\$7,594,463	\$0.9551

*The distinctions, "bituminous" and "cannel," are in accordance with trade usage. While, of course, cannel is simply a variety of bituminous coal, its peculiar characteristics and higher market value render it necessary that it shall be considered apart from the more commonly occurring varieties.

Compared with the prices obtained in 1904, the bituminous figures show a loss of 3.00 cents for the aggregate of all districts. By districts they show a loss of 3.29 cents in the average price obtained in the Western district; a loss of 4.49 cents for the Southeastern district, and a gain of 7.45 cents for the Northeastern one.

REPORT OF INSPECTOR OF MINES.

VALUE OF BITUMINOUS FOR 1906.

Selling value of the bituminous produce per ton, at the mine, for each district, was as follows:

DISTRICT.	Tonnage.	Total Value.	Average Value.
Western -----	5,788,491	\$5,202,665	\$0.8988
Southeastern -----	2,992,676	3,611,109	1.2067
Northeastern -----	752,391	764,996	1.0167
Total -----	9,533,558	\$9,578,770	\$1.0047

Compared with average prices obtained in 1905, the bituminous figures show gains for the respective districts as follows: For the Western district, 3.99 cents; for the Southeastern, 9.33 cents; for the Northeastern 3.95 cents. A considerable proportion of the gains in the Western and Southeastern districts was simply a recovery from the low prices of 1905 as compared with 1904. Compared with the prices obtained in 1904, the gains for 1906 were as follows: For the Western district, 7-10 of a cent; for the Southeastern 4.84 cents; for the Northeastern, 11.40 cents per ton.

MACHINE MINED COAL.

With respect to the percentage of the total output that is mined by machine, Kentucky continues to be one of the leading machine-mining States. In 1902 mining machines were used by 31 companies; in 1903 the number was increased to 36; in 1904 it advanced to 45; in 1905 it grew to 51; and in 1906 the number was 62.

MACHINE COAL FOR 1905.

Nearly 55 per cent. of the output for 1905 was mined by machines. Machines were used by fifty-one companies, in

seventy-one mines, distributed among seventeen of the twenty-five counties that produced commercial coal. The total number of machines used was 561, of which 393 were punchers, two were cutter-bar (driven by air), and 166 were electric chain cutters. Although the number of punchers exceeds that of the electrics, the latter were used by about the same number of companies. The amount of coal mined by machine in each district, together with the percentage relation of the machine-cut coal to the total product of the district, was as follows:

DISTRICT.	Tons Cut by Machine.	Per Cent. of Product.
Western -----	3,257,259	69.57
Southeastern -----	1,031,728	37.19
Northeastern -----	127,352	22.04
Total -----	4,416,339	54.93

Of the amount mined by machine, 2,287,814 tons were cut by air, and 2,128,525 tons were cut by electricity. Hopkins continues to be the leading machine-mining county, with respect to the percentage relation its machine-cut coal bears to the total product mined by machine. Of the other more important machine counties, Muhlenberg, Ohio, Knox, Bell and Whitley follow in the order named.

MACHINE COAL FOR 1906.

In 1906, machines for mining were used by 62 companies in 19 of the 26 counties that produced commercial coal. As between the use of air and electric machines the companies are about equally divided. In the Western district electricity (in number of companies using) is most favored, though in number of machines air is ahead. In the Southeastern district air is far in the lead, both in number of companies using and number of machines. In the Northeastern district there is an equal division as to the number of companies using, though there are twice as many air as there are electric machines.

WESTERN DISTRICT—Continued.

Christian County—

Empire C. & M. Co., Empire -----	92,747
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Daviness County—

Louis Hoback, Owensboro -----	722
Overstreet & Rudy, Owensboro -----	11,292
Owensboro C. & L. Co., Owensboro -----	10,126
Owensboro C. & M. Co., Owensboro -----	334
J. Lee Rudy, Owensboro -----	6,694

Total -----	29,168
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Hancock County—

Fenley Coal Co., Hawesville, R. F. D. No. 1 -----	39,954
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Henderson County—

Corydon Coal Co., Corydon -----	4,358
Green River Coal Co., Spottsville -----	56,456
Magnolia C. & M. Co., Corydon -----	5,846
J. L. Nicholson & Co., Henderson -----	12,460
Peoples' M. Co., Henderson -----	11,779
Pittsburg C. Co., Baskett -----	43,519
Rash, Denton & Co., Robards -----	1,000
Smith Mills C. & M. Co., Smith Mills -----	2,982
Utopia Coal Co., Curdsville -----	12,521
William Hayes & Sons, Zion -----	2,883

Total -----	153,804
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Hopkins County—

Daniel Boone C. Co., Daniel Boone -----	74,332
Carbondale C. & C. Co., Hamby Station -----	41,147
Crabtree C. & M. Co., Ilsley -----	111,475
Kington & Wolf C. Co., Mortons -----	38,875
Nortonville C. Co., Nortonville -----	91,878
Oak Hill C. Co., Chesley -----	80,430
Reinecke C. & M. Co., Madisonville -----	276,628
Rose Creek Coal Co., Nebo -----	40,497
Brasher C. Co. (Royal) Madisonville -----	44,480
St. Bernard M. Co. (8 mines) Earlington -----	1,060,105
Victoria C. Co., Madisonville -----	129,745

Total -----	1,989,574
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McLean County—

Green River C. & C. Co., Island -----	63,629
Memphis C. Co. -----	44,314

Total -----	107,943
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WESTERN DISTRICT—Continued.

Muhlenberg County—

Bevier Coal Co., Cleaton	74,181
Black Diamond C. & M. Co., Drakesboro.....	67,862
Central C. & I. Co. (Central), Central City	165,602
Crescent C. Co., Bevier	170,738
Dovey C. Co., Central City	56,762
Louisville & Atlanta C. Co., Drakesboro	38,735
Beech Creek C. Co., Browder	1,700
W. G. Duncan C. Co., Luzerne	288,221
Tade Foley, South Carrollton	5,000
Greenville C. Co., Powderly.....	31,068
Hillside C. Co., Greenville.....	44,110
Lam C. Co., Bevier.....	5,547
R. Morgan C. Co., Central City.....	52,457
Oakland C. Co., Greenville	39,831
W. A. Wickliffe C. Co., Browder.....	2,568

Total 1,044,402

Ohio County—

Central C. & I. Co. (Render), Central City.....	85,552
Deaneville C. Co., Aetnaville.....	13,424
Fordsville Block Coal Co., Fordsville	7,150
Green River M., M. & T. Co., Coffman	9,661
McHenry C. Co. (2), McHenry.....	166,046
Peacock C. Co., Reynolds.....	640
Taylor C. Co., Taylor Mines.....	126,060
Williams C. Co., McHenry.....	119,701

Total 528,234

Union County—

Bell Union C. Co., Curley.....	10,289
Crittenden C. & C. Co., Marion.....	7,066
Davidson & Sons, Uniontown	4,759
Marion C. Co., Sullivan.....	11,737
Morganfield C. Co., Morganfield.....	11,132
Ohio Valley C. & M. Co., DeKoven.....	97,977
Southern Tidewater Coaling Co., Uniontown	23,535
Waverly C. Co., Waverly.....	6,316
West Kentucky C. Co. (2), Sturgis.....	167,814

Total 340,625

WESTERN DISTRICT—Continued.

Webster County—

Thomas Blackwell C. & M. Co., Clay-----	2,781
R. L. Forsythe, Providence-----	7,350
S. K. Luton, Providence-----	2,000
Hess & Son, Clay-----	2,900
Providence C. Co-----	109,131
Sebree C. Co., Sebree-----	57,745
St. Bernard M. Co. (Shamrock), Earlington-----	60,397
Thomas Wanless, Providence-----	9,370
Webster County C. Co., Providence-----	12,785
West Kentucky C. Co., Sturgis-----	80,739
L. Wright, Providence-----	4,400
Total -----	349,598

SOUTHEASTERN DISTRICT—

Bell County—

Bell Jellico C. Co., Bell Jellico-----	45,332
Black Raven C. Co., Fourmile-----	52,655
Black Bear C. Co., Fourmile-----	28,718
Blue Gem C. Co., Flatlick-----	5,055
Columbia C. Co., Middlesboro-----	2,500
Excelsior C. Co., Excelsior-----	85,326
Fern Lake C. Co., Middlesboro-----	19,006
Highland Rim. M. Co., Fourmile-----	49,558
Luke & Drummond C. Co., Logmont-----	23,970
Queensbury C. & C. Co., Middlesboro-----	10,496
Sagamore C. Co., Longmont-----	47,628
Stony Fork C. Co., Middlesboro-----	40,441
Straight Creek C. & C. Co., Straight Creek-----	207,850
Turner C. Co., Middlesboro-----	13,966
Wallsend C. & C. Co., Wallsend-----	84,129
Winona C. & C. Co., Middlesboro-----	46,852
Total -----	763,482

REPORT OF INSPECTOR OF MINES.

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SOUTHEASTERN DISTRICT—Continued.

Knox County—

Artemus Jellico C. Co., Artemus	15,172
Bailey C. Co., Bailey's Switch	2,638
Bennett Jellico Co., Artemus	975
Cottengem & Hammons, Barbourville	4,025
East Jellico C. Co., Coalport	62,099
Hughes Jellico C. Co., Flatlick	74,167
Ingles C. Co., Hujel	4,496
North Jellico C. Co. (3), Bertha	387,520
North P't Jellico C. Co., Gray	19,110
Ross Jellico C. Co., Gray	9,312

Total 579,514

Laurel County.

G. W. Curvin, Viva	18,424
Laurel River C. Co., Lily	1,400
Lily Jellico C. Co., Lily	10,745
New Altamont C. Co., Altamont	28,021
New Laurel C. Co., Pittsburgh	66,108
O. K. Jellico C. Co., Lily	3,299
Phenix Jellico C. Co. & N. Diamond, Altamont	79,759
Phenix Jellico C. Co. & Standard, Altamont	33,809
Pitman C. Co., Pittsburgh	44,219
Pittsburgh C. Co., Pittsburgh	64,538
Pritchard Coal Co., East Bernstadt	11,386
Star C. Co., East Bernstadt	47,054

Total 408,762

Pulaski County—

Alpine C. Co., Alpine	28,350
Eagle C. Co., Barrenfork	69,201
Indian Head C. Co., Parker's Lake	22,707
New Cumberland C. Co., McGuffey	34,264
Mahoning C. Co., Parker's Lake	7,794
Peters & Souleyret, Flatrock	20,848

Total 183,164

Rockcastle County—

Big Hill C. Co., Orlando	69,770
New Livingston C. Co., Livingston	12,075
New Pine Hill C. Co., Pine Hill	3,350

Total 85,195

SOUTHEASTERN DISTRICT—Continued.

Whitley County—

Anderson C. Co., Halsey	14,199
Burk Hollow C. Co., Jellico, Tenn	9,397
Campbell C. & M. Co., and H. & Berry, Wofford	31,905
Cane Cr. Blue Gem C. Co., Jellico, Tenn	2,070
Davisson Bros., Pleasant View	350
Dowlais Blue Gem C. Co., Jellico, Tenn	6,628
Elite C. Co., Jellico, Tenn	12,853
East Tennessee Coal Co., Jellico, Tenn	51,991
French C. Co., Halsey	14,630
Imperial Jellico C. Co., Rockhold	46,524
Jellico C. M. Co., Mountainash	84,856
Jellico M. Co., Saxton	15,580
Louisville Property Co., Halsey	26,131
Main Jellico Mtn. C. Co., Kensee	98,255
Cooke Jellico C. Co., Jellico, Tenn., R. F. D. No. 1	15,730
Mt. Morgan C. Co., Williamsburg	62,658
Pine Knota C. Co., Strunk	50,037
Pleasant View Jellico C. Co., Pleasant View	4,324
Ponoco C. Co., Williamsburg	1,565
Procter C. Co., Redash	94,265
Stearns C. Co., Stearns	69,411
Troutman Blue Gem C. Co., Halsey	1,451
Watts Creek Jellico C. Co., Wofford	21,232
Wender Blue Gem C. Co., Halsey	3,200
West Jellico C. Co., Strunk	20,200

Total	759,442
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NORTHEASTERN DISTRICT—

Boyd County—

John Wurts, Lessee (A. I. & M. No. 8), Ashland	32,371
Geo. Hull, Rush	866
Princess L. & M. Co., Princess	14,296

Total	47,533
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Breathitt County—

Kentucky Union Co., Jackson	32,550
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Carter County—

Adkins C. Co., Mt. Sterling	22,542
Ashland I. & M. Co. (No. 10), Ashland	44,909
Dawson Branch mine (McNeal and others), Rush	2,483
Eastern Ky. Ry. Co., Riverton	9,616
Kentucky Cannel Co., Riverton	7,085
Strait Creek C. Co., Denton	34,526

Total	121,161
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NORTHEASTERN DISTRICT—Continued.

Johnson County.

Acrogen C. Co., Paintsville-----	813
Meek C. Co., Meek-----	16,381
Rittenhouse C. Co., River-----	1,582
Sandy River C. Co., Williamsport-----	12,761
Whitehouse C. Co., Louisa-----	22,203

Total -----	53,745
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Lawrence County—

Peach Orchard C. Co., Peach Orchard-----	40,296
Torchlight C. Co., Louisa-----	3,593

Total -----	43,889
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Lee County—

South Fork C. Co., Beattyville-----	36,185
J. C. Richardson C. Co., Beattyville-----	28,258
Beattyville B. C. Co., Whiteash-----	24,466
McGuire C. Co., Beattyville-----	5,454
White Ash C. Co., Whiteash-----	2,217

Total -----	96,580
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Morgan County—

Bigstaff C. C. Co., Bigstaff-----	102
Eureka C. C. Co. (now Mayflower), Caney-----	4,405
Ky. Block C. C. Co., Cannel City-----	64,561
Watson Mine, Caney-----	3,414
White Oak C. C. Co., Piedmont-----	6,328

Total -----	78,810
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Pike County—

Borderland C. Co., Borderland, W. Va-----	57,557
Pike Collieries Co., Matewan, W. Va-----	11,556
Vulcan C. Co., Vulcan, W. Va-----	34,249

Total -----	103,362
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OUTPUT BY COUNTIES FOR 1906.

Following is the output reported by the respective coal companies, arranged according to counties, in the three inspection districts for 1906. In some instances changes occurred in the ownership of mines during the year; usually in such case, for convenience in tabulation, the operator who was in charge at the end of the year is named, even though the larger part

of the output of the mine may have been produced prior to his taking charge.

WESTERN DISTRICT—

Tons.

Butler County—

Aberdeen C. & M. Co., Morgantown.....	2,760
Morgantown C. & M. Co., Morgantown.....	3,211
Ben Topmiller, Sr., Morgantown.....	5,765

Total	11,736
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Christian County—

Empire Coal & Mining Co., Empire.....	79,141
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Daviss County—

Louis Hoback, Owensboro.....	2,688
Geo. Lucas, Owensboro.....	2,800
Overstreet & Rudy, Owensboro.....	15,109
Owensboro C. & L. Co., Owensboro, R. F. D. No. 4.....	17,058
Owensboro C. & M. Co., Owensboro, R. R. No. 4	40
J. Lee Rudy, Owensboro.....	9,082

Total	46,777
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Hancock County—

Fenley C. Co., Hawesville, R. F. D. No. 1.....	19,361
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Henderson County—

John Archbold, Bluff City.....	40,812
Corydon C. Co., Corydon.....	4,203
Green River C. Co., Spottsville.....	39,339
Wm. Hayes & Sons, Zion.....	3,532
Magnolia C. & M. Co., Corydon.....	6,811
Keystone Mg. & Mfg. Co., Henderson.....	9,400
J. L. Nicholson & Co., Henderson.....	3,063
People's Mg. Co., Henderson.....	15,989
Pittsburg C. Co., Baskett.....	61,390
Panama C. & C. Co., Robards.....	3,956
Smith Mills C. & M. Co., Smith Mills.....	3,895
Utopia C. Co., Curdsville.....	18,510

Total	210,900
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WESTERN DISTRICT—Continued.

Hopkins County—

Carbondale C. & C. Co., Hamby Station-----	41,852
Crabtree C. M. Co., Isley-----	115,972
Daniel Boone C. Co., Daniel Boone -----	83,144
Kington & Wolfe C. Co., Morton -----	21,241
Nebo Consolidated C. & C. Co., Nebo-----	2,200
Nortonville C. Co., Nortonville-----	137,343
Brasher C. Co., later Chesley C. Co., Chesley-----	57,560
Reinecke C. M. Co., Madisonville -----	230,093
Rose Cr. C. Co., Nebo-----	68,433
Royal Mine; (Brasher C. Co., later Chesley C. Co.), Madisonville -----	104,167
St. Bernard M. Co. (8 mines), Earlington -----	1,177,066
Victoria C. Co., Madisonville-----	139,545
Total -----	2,178,616

McLean County—

Green River C. Co., Livermore-----	3,719
Green River C. & C. Co., Island-----	98,708
Memphis C. Co., Island-----	52,299
Alva Karnes, Island-----	7,000
Total -----	161,726

Muhlenberg County—

Beech Creek C. Co., Browder-----	11,105
Bevier C. Co., Cleaton-----	109,736
Brown-Lam C. Co., Hillside -----	14,880
Black Diamond C. & M. Co., Drakesboro-----	84,786
Central C. & I. Co., Central City-----	198,677
Crescent C. Co., Bevier-----	214,487
Dovey C. Co., Hillside-----	81,123
W. G. Duncan C. Co. (three mines), Luzerne-----	391,158
Elk Valley C. Co., Drakesboro-----	6,803
Tade Foley, South Carrollton-----	1,000
Greenville C. Co., Powderly-----	43,305
Hillside C. Co., Greenville-----	42,772
Holt C. Co., Central City-----	15,870
Lam C. Co., Bevier-----	60,856
Louisville-Atlanta C. Co., Drakesboro-----	47,533
R. Morgan C., Central City-----	75,739
Oakland C. Co., Greenville-----	56,921
W. A. Wickliffe C. Co., Browder-----	35,154

Total ----- 1,491,905

WESTERN DISTRICT—Continued.

Ohio County—

Broadway C. M. Co., McHenry	34,220
Central C. & I. Co. (Render), Central City	70,795
Deaneffeld C. Co., Aetnaville	15,390
Fordsville B. C. Co., Fordsville	5,610
Green River C. M. Co., Coffman	9,283
McHenry C. Co. (2), McHenry	201,850
Peacock C. Co., Reynolds	1,863
Taylor C. Co., Taylor Mines	173,452
Williams C. Co., McHenry	181,633
Total	694,096

Union County—

Bell Union C. & C. Co.	20,696
Davidson & Sons, Uniontown	5,086
Marion C. Co. (now Sullivan C. Co.), Sullivan	17,466
Morganfield C. & M. Co., Morganfield	21,645
Ohio Valley C. & M. Co., DeKoven	133,281
Southern Tidewater Coaling Co., Uniontown	41,955
Thomas C. Co., Morganfield	9,355
Waverly C. Co., Waverly	19,956
West Kentucky C. Co. (2), Sturgis	120,325
Total	389,765

Webster County—

T. Blackwell C. M. Co., Clay	7,026
Fairmont C. M. Co., Providence	7,438
R. L. Forsythe, Providence	6,645
S. K. Luton, Providence	7,461
Providence C. Co. (2), Providence	143,387
Sebree C. Co., Sebree	72,711
St. Bernard M. Co. (Shamrock), Earlington	86,302
Thos. Wanless, Providence	9,975
Webster County C. Co., Providence	42,053
West Kentucky C. Co. (3), Sturgis	99,283
L. Wright, Providence	4,187
Williams & Patterson, Wheatcroft	18,000
Total	504,468

SOUTHEASTERN DISTRICT—

Bell County—

Bell Jellico C. Co., Bell Jellico	77,403
Big Hill C. Co., Blanche	20,750
Black Raven C. Co., Fourmile	42,529
Edw. Blake, lessee, Fourmile	29,062
Clear Fork C. & C. Co., Middleboro	37,056
Coleman M. Co., Cary	6,549
Columbia C. Co., Middlesboro	60,862
East Jellico C. Co., Bell Jellico	726
Excelsior C. M. Co., Excelsior	73,743
Fern Lake M. Co., Middlesboro	9,444
Highland Rim. M. Co., Fourmile	53,656
Luke & Drummond Co., Logmont	27,930
St. Clair C. Co., Middlesboro	6,097
Sagamore C. Co., Logmont	56,113
Shamrock C. & C. Co., Shamrock	23,867
Stony Fork C. Co., Middlesboro	60,126
Straight Creek C. & C. Co., Straight Creek	191,637
Straight Creek C. M. Co., Cary	26,531
Turner C. Co., Middlesboro	23,563
Wallsend C. & C. Co., Wallsend	81,083
Winona C. & C. Co., Middlesboro	58,253
Total	969,993

Knox County.

Artemus Jellico C. Co., Artemus	11,409
Bailey C. Co (now Richland Jellico C. Co.), BaBiley's Switch	2,251
Bennett Blue Gem C. Co., Barbourville	1,290
Bennett C. Co., Trosper	2,171
Bennett Jellico C. Co., Trosper	24,001
Blue Gem C. Co. (out of business), Flatlick	1,125
Coalport C. Co. (Black's mine), Coalport	9,994
Cottengem & White C. Co., Barbourville	12,245
Cumberland C. Co., Warren	15,700
East Jellico C. Co.	9,917
J. T. Gray, Gray	15,200
Hughes Jellico C. Co., Flatlick	79,814
Ingles C. Co., Hujel	38,782
Lynn Camp C. Co., Gray	1,459
Mathews-Jellico C. Co., Hujel	46,300
North Jellico C. Co. (all mines), Wilton	359,717
North Point Jellico C. Co., Gray	22,362
Rossland C. Co., Rossland	16,839
Total	664,576

REPORT OF INSPECTOR OF MINES.

SOUTHEASTERN DISTRICT—Continued.

Laurel County—

Perry Cole, Pittsburg-----	3,000
G. W. Curvin, Viva-----	17,820
Wm. Dunavent, Pittsburg. (Included in New Laurel.)	
Lily Jellico C. Co., Lily -----	10,710
New Altamont C. Co., Altamont-----	20,302
New Laurel C. Co., Pittsburg-----	71,938
New Victoria C. Co., Pittsburg-----	1,000
Phenix Jellico C. Co. (all mines), Altamont-----	95,787
Pittsburg C. Co., Pittsburg-----	71,927
Pitman Coal Co., Pittsburg-----	37,288
S. W. Rockwell, Pittsburg-----	5,100
Star Coal Co., East Bernstadt-----	49,100

Total ----- 383,972

Pulaski County—

Alpine C. Co., Alpine-----	23,417
Eagle C. Co., Barrenfork-----	61,515
Indian Head C. Co., Parker's Lake-----	26,670
Mahoning C. Co., Parker's Lake -----	13,399
New Cumberland C. Co., McGuffey-----	45,064
Peters & Souleyret, Flatrock-----	19,734

Total ----- 189,799

Rockcastle County—

Big Hill C. Co. (moved to Bell) -----	3,671
New Livingston C. Co., Livingston-----	7,885

Total ----- 11,556

SOUTHEASTERN DISTRICT.—Continued.

Whitley County—

Anderson C. Co., Halsey-----	15,206
Burk Hollow C. Co., Jellico, Tenn-----	8,165
Campbell C. M. Co., Coalmont-----	38,205
Cooke Jellico C. Co-----	22,203
Dowlais Blue Gem C. Co., Jellico, Tenn-----	4,165
East Tenn. C. Co., Jellico, Tenn-----	42,942
Elite C. Co., Jellico, Tenn-----	14,405
French C. Co., Halsey-----	16,110
Imperial-Jellico C. Co., Rockhold-----	36,641
Jellico C. M. Co., Mountainash-----	95,648
Jellico M. C., Saxton -----	14,281
Louisville Property Co., Halsey-----	37,956
Main Jellico, Mt. C. Co., Kensee-----	96,151
Mt. Morgan C. Co., Williamsburg-----	58,087
Pine Knot C. Co. (now out of business)-----	12,036
Pleasant View Jellico C. Co., Pleasant View-----	7,181
Pocono C. Co., Williamsburg-----	1,281
Procter C. Co., Redash-----	94,183
James Rogers Blue Gem Mine, Jellico, Tenn-----	300
Stearns C. Co., Stearns-----	105,003
Watts Creek Jellico C. Co., Wofford-----	21,860
Wender Blue Gem C. Co., Halsey-----	4,175
S. A. Wender, Jellico, Tenn-----	5,017
West Jellico C. Co., Strunk-----	15,730
Sunbeam C. Co., Jellico, Tenn-----	7,800

Total ----- 774,739

NORTHEASTERN DISTRICT—

Boyd County—

Ashland I. & M. Co., Ashland-----	6,424
Geo. Hull, Rush-----	4,301
Princess Land & M. Co., Princess -----	19,947
John Wurts, lessee, Ashland-----	20,225

Total ----- 50,897

REPORT OF INSPECTOR OF MINES.

Breathitt County—

Kentucky Union Co., Jackson-----	29,270
Carter County—	

Adkins C. Co., Mt. Sterling-----	17,357
J. Bates, lessee (all mines), Ashland-----	44,518
Eastern Ky. Ry. Co., Riverton-----	33,246
Ky. Cannel Co., Riverton-----	3,155
Dawson Branch mine (J. H. Jacobs), Rush-----	10,474
Strait Creek C. Co., Denton-----	54,670

Total -----	164,020
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Floyd County—

Preston C. Co., Woods-----	6,320
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Johnson County—

Acrogen C. Co., Paintsville-----	29,419
East Kentucky C. Co., East Point-----	4,984
Meek C. Co., Meek-----	20,554
Muddy Branch C. Co. and Northeast C. Co., Paintsville-----	11,036
Rittenhouse C. Co., River-----	9,198
Sandy River C. Co., Williamsport-----	12,799
Whitehouse C. C. Co., Louisa-----	10,203

Total -----	98,193
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Lawrence County—

Peach Orchard C. Co., Peach Orchard-----	42,530
Torchlight C. Co., Louisa-----	2,489

Total -----	45,019
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Lee County—

Beattyville Block C. Co., Beattyville-----	40,163
McGuire C. Co., Beattyville-----	3,781
J. C. Richardson C. Co., Beattyville-----	23,502
South Fork C. Co., (changed hands)-----	12,621

Total -----	79,067
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Morgan County—

Eureka C. C. Co. and Mayflower C. C. Co., out of business-----	2,780
Ky. Block C. C. Co., Cannel City-----	47,759
Watson C. C. Co., and Caney C. C. Co., Caney-----	2,157
White Oak C. C. Co., Piedmont-----	610

Total -----	53,306
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Pike County—

Borderland C. Co., Borderland, W. Va-----	93,850
Edgewater C. and Co., Hellier-----	690
Freeburn C. and C. Co., Edgerton, W. Va-----	57,933
Greenough C. and C. Co., Hellier-----	6,149
Henry Clay, C. & C. Co., Lookout-----	5,182
Marrowbone C. and C. Co., Lookout-----	590

Pike C. and C. Co., Hellier-----	10,234
Pike Collieries Co., Matewan, W. Va-----	64,583
Thacker C. Mg. Co., Thacker, W. Va-----	7,510
Vulcan Coal Co., Vulcan, W. Va-----	42,590
Total -----	289,311

Those counties which produced 200,000 tons or more come in the following order: Hopkins, Muhlenberg, Bell, Whitley, Ohio, Knox, Webster, Union, Laurel, Pike and Henderson. In 1901 Bell county stood sixth, Whitley county stood second, Knox seventh and Webster tenth. In six years Bell has more than trebled its output and Webster's output has been increased more than fourfold.

PRODUCTION OF COKE.

Although the possessor of a larger continuous area of thick, high-grade coking coal than any other State, Kentucky is still unimportant as a producer of coke.

For 1905.

The output of coke by companies for 1905 was as follows:

Company.	Tons of coke.	Tons of coal used.
St. Bernard Mining Co-----	44,782	101,411
Ohio Valley Coal & Mining Co-----	2,465	6,659
Straight Creek Coal & Coke Co-----	17,311	35,743
Ashland Iron & Mining Co-----	917	2,088
Total -----	65,475	145,901

The Straight Creek ovens were burning only six months. The Ashland ovens produced much more coke than given above, but the amount indicated was all that was made from Kentucky coal. The Wallsend ovens, which produced 1,601 tons in 1904, were idle.

For 1906.

The coke output for 1906 amounted to 61,521 short tons. This was a decrease of 3,954 tons from the output for 1905. Nearly all the loss occurred in the Western field. Following was the production in tons by companies:

Company.	Tons of coke.	Tons of coal used.
St. Bernard Mining Co.-----	41,165	92,612
Ohio Valley Coal & Mining Co.-----	2,937	6,654
Straight Creek Coal & Coke Co.-----	17,419	36,257
Totals -----	61,521	135,533

The Asland Iron & Mining Company's ovens, which for several years received a small part of their supply from the company's "No. 8, Boyd county mine, used no Kentucky coal in 1906. The Wallsend ovens were idle.

NUMBER OF EMPLOYES AND DAYS WORKED.

There were 15,038 persons employed at and in the mines in 1905, 11,995 of them working underground. They were distributed among the districts as follows: Western, 7,296; Southeastern, 6,172; Northeastern, 1,570.

The output for 1906 was produced by 207 companies, operating 277 mines. Compared with 1905, this was an increase of 33 companies and 47 mines. There were 16,718 persons employed, of whom 12,938 worked underground. The outlook is for a further large increase in the number of companies and mines for 1907; indeed so rapidly is the number of mines increasing that, with the added duty of inspecting miners' oil that was placed upon it by the last Legislature, the field force of the Mine Inspector's office is hard pressed to keep up the necessary number of inspections per annum. The number of persons employed in each district and the average number of days worked in 1906 were as follows:

District.	Companies.	Total Employees.	Employed Inside	Days Worked
Western -----	84	7,843	6,507	188
Southeastern -----	84	6,960	5,108	174
Northeastern -----	39	1,915	1,365	197
Totals -----	207	16,718	12,980	559

The counties in which 1,000 or more persons were employed were as follows: Hopkins, 2,498; Muhlenberg, 2,150; Bell, 2,086; Whitley, 2,044; Knox, 1,379; Ohio, 1,090.

The number of hours that constitute a working day varies according to localities. In the Western field it is either eight or ten, while in the Eastern one it is either nine or ten. For convenience of making comparisons all days have been reduced to ten-hour days in this statement.

POWDER AND ANIMALS.

Returns relating to consumption of powder are only approximately correct. Some companies do not attempt to keep an accurate record, and when pick miners are employed (who furnish their ammunition themselves) they not infrequently buy more or less of their powder elsewhere than at the commissary. The returns received indicate a consumption of 145,741 or more kegs in 1905, and of 182,650 or more in 1906. A total of about 1,742 animals were employed in 1905, and of about 1,934 in 1906. Following are the aggregate returns from each district, showing the number of kegs of powder used and the average number of animals employed underground, for the years 1905 and 1906:

REPORT OF INSPECTOR OF MINES.

District.	Kegs of Powder.		Animals Inside.	
	1905	1906	1905	1906
Western -----	76,016	102,320	889	833
Southeastern -----	54,225	55,168	506	518
Northeastern -----	15,500	25,162	120	156
Totals -----	145,741	182,650	1,515	1,507

IV.

PRODUCTION OF FLUORSPAR, LEAD AND ZINC.

[Chapters IV. and V. are abstracts from Bulletin No. 9 of the Kentucky Geological Survey, on the Fluorspar Deposits of Kentucky, etc., which has just been completed by Mr. F. Julius Fohs, one of the assistant geologists of the Survey. The complete bulletin consists of eight chapters and appendix, and is a thorough discussion of the occurrence, mining, milling, technology and statistics of fluorspar. In addition are statistics relating to the production of lead and zinc in Western Kentucky, and some data concerning barite deposits in Central and Western parts of the State. The appendix includes a note on cobalt and nickel in Western Kentucky.—C. J. N.]

PRODUCTION OF FLOURSPAR.

The Western Kentucky District has become, since 1896, one of the largest producers in the world. Its yearly production for the past ten years was greater than that of any American district, except in 1906 when Southern Illinois somewhat surpassed it, and greater than that of any foreign country save Germany and Great Britain, the last having exceeded it only since 1905, Caldwell, Crittenden and Livingston were the producing counties, but by far the major part has been produced by Crittenden County. Fluorspar has been found also in the adjoining counties, Christian, Lyon and Trigg, but as yet has not been produced in quantity from them.

The Southern Illinois district, comprising Pope and Hardin counties, is its largest American competitor. The Central Tennessee district, comprising Smith, Trousdale and Wilson counties, and the Colorado districts in Boulder and Custer counties, are small producers, the latter supplying part of the Colorado demand. The Castle Dome district in Yuma county, Arizona, from 1902 to 1904, was also a small producer, supplying part of the Western demand.

The first fluorspar shipments from an American mine so far as it is possible to determine, were made from this district in 1871. The River Valley Mining Co., operating the Royal mines, made some small shipments that year. This company erected the first mill here, for grinding fluorspar, it being of the ordinary grist mill type. For No. 1 ground spar they received \$60 per ton and for No. 2 they received \$30 at glass works in Baltimore. Although they had a fair demand for both lump and ground at high prices, owing to financial difficulties the company was compelled to suspend. About the same time some fluorspar was mined at the Yandell mines, though none was shipped till 1878, when they were operated by Henry Glass. The first fluorspar shipments were made in the early seventies from the Rosiclare mines.

The Dycusburg Lead Mining Co., Cincinnati Lead & Spar Mining Co., and the Walton Spar Mining Co., made fluorspar shipments from 1882 to 1886, the amount of which is unknown. The fluorspar was mined at the Yandell, Memphis and Beard mines. Some 1,500 tons were shipped in 1886, according to Mineral Resources for that year.

About 1893, J. W. Waggoner is said to have come into the district and begun mining fluorspar from shallow pits, shipping both in bulk and barrels.

Porter and Hudson began really the first active shipments in 1896, and the Kentucky Lead & Fluorspar Co., which they formed in 1897, continued to make shipments. They erected a sort of flouring mill at Memphis mines for grinding No. 1 fluorspar. No figures are available for these years and merely estimates have been given in the table.

The Fluorspar Co. succeeded Mr. Waggoner in 1898 and made small shipments that year. This and the Kentucky Fluorspar Co. of Tennessee (successors to the Kentucky Lead & Fluorspar Co.) were the only American shippers, the latter shipping considerably the most.

The same companies were among the shippers in 1899, though two new companies were added to the list. The National Lead, Zinc, & Fluorspar Co. made their first shipments of fluorspar—No. 2 brown lump—from the Marble mine, and the Eagle Fluorspar Co. shipped all grades from the Hudson, Babb, Guill and Evening Star mines. The Ken-

tucky Fluorspar Co. remained the largest producer; during the year it discontinued the Memphis Mill and erected the Kentucky Mill just above the depot at Marion, since which time it has ranked among the three largest American producers of ground fluorspar. The same year the Eagle Fluorspar Co. erected a mill for the concentration of lead, zinc and fluorspar, and in addition installed an improved fluorspar grinding plant, shipping several hundred tons of ground fluorspar that year. Owing to their desire to concentrate their efforts on the separation problem, the grinding plant was not used after that year.

In 1900, the same companies made shipments. The Fluorspar Co. was reorganized in February of that year, and during 1900 and 1901 its shipments amounted to nearly one-fourth of the total for the district. The Kentucky Fluorspar Co. shipped about 60 per cent. of the output for 1900.

The Chicago Mining Co. made small shipments for the first time in 1901, the Kentucky Fluorspar Co., the Fluorspar Co., and the Eagle Fluorspar Co. being the other shippers. The quantity shipped ranked, beginning with the first, in the order named.

February, 1902, witnessed the consolidation of The Fluorspar Co. and the Kentucky Fluorspar Co. of Tennessee as the Kentucky Fluorspar Co., a Kentucky corporation, which shipped the bulk of the product in 1902. Companies making small shipments that year were the Eagle Fluorspar Co. the Lucile Mining Co. (successor to the Chicago Mining Co.) and the National. The Pittsburg Mining and Reduction Co. erected a small grinding mill at the Pittsburg mines, but this was not a success, as their fluorspar contained too much calcite. The Marion Mineral Co. began the production and sale of unwashed gravel fluorspar in the latter part of the year. This year witnessed great activity throughout the district, and the shipments were greater than in any year preceding 1905. The U. S. Geological Survey, in co-operation with the Curator of the State Geological Department, made a preliminary investigation of the resources of the district in 1902.

In 1903, we find the Kentucky Fluorspar Co., The Marion Zinc Co., the Marion Mineral Co. and the Pittsburg Mining & Reduction Co. paying freight tariffs, in amounts ranking in

the order named; all except the first in amounts on less than twelve hundred tons. This year fell but little behind 1902.

The year 1904 was more apathetic than either of the two preceding years. The Kentucky Fluorspar Company continued considerably the largest producer, with the Marion Mineral Co. second. The remaining three shippers were the Pittsburg Mining & Reduction Co., the Marion Zinc Co., and Roberts & Co., the latter the only new company, all in quantities less than 500 tons. The falling off in shipments as compared with 1902 and 1903 was due to two causes: First, the condition the mines had been put in by not doing sufficient dead work ahead to develop new bodies of fluorspar along the veins, thus requiring this work to be done with a less output of Fluorspar. Second, the market for flux was not as steady, due to depression of iron and steel industries.

Statistics of Production.

In Table I, is given the fluorspar output of the principal producing countries in metric tons.* This shows the United States and Germany to stand neck and neck for first place with Great Britain lagging but little behind. France and Spain each have small productions.

*A metric ton contains 2204.6 lbs. avordupois, and is equal to 1,1023 tons of 2000 lbs.—C. J. N

TABLE I.
FLUORSPAR OUTPUT OF THE PRINCIPAL PRODUCING COUNTRIES.*

(In Metric Tons.)

Year.	France.	Germany	Spain.	United Kingdom.	United States.
1896	1,940	21,603	3	400	5,442
1897	2,722	23,232	2	302	8,973
1898	3,077	23,787	5	67	11,021
1899	5,140	24,306	310	798	21,806
1900	3,430	30,310	4	1,471	19,646
1901	3,970	28,741	Nil	4,232	17,768
1902	2,650	14,177½	93	6,388	47,190
1903	2,447	13,028½	4,000	12,102	38,577
1904	2,047	13,540½	(†)	18,160	33,069
1905	(‡)	15,019½	(‡)	39,466	35,299
1906	.....	.....	....	36,280	28,655

*Mineral Industry, Vol. XIV., p. 199, with corrections and additions that are to appear in Vol. XV.

§Exports: German statistics no longer report production of Fluorspar.

†Not reported.

‡Not yet published.

Fluorspar shipments previous to 1896 are here presented:

TABLE II.

PRODUCTION OF FLUORSPAR IN THE UNITED STATES 1882-1895*.

(In Short Tons.)

Year.	Quantity.	Value.	Average value per ton.	Year.	Quantity.	Value.	Average value per ton.
1882	4,000	\$20,000	\$5.00	1889	9,500	\$45,835	\$4.82
1883	4,000	20,000	5.00	1890	8,250	55,328	6.71
1884	4,000	20,000	5.00	1891	10,044	78,330	7.80
1885	5,000	22,500	4.50	1892	12,250	89,000	7.26
1886	5,000	22,000	4.40	1893	12,400	84,000	6.77
1887	5,000	20,000	4.00	1894	7,500	47,500	6.33
1888	6,000	30,000	5.00	1895	4,000	24,000	6.00

*From Mineral Resources, U. S. Geological Survey.

Table III., now presented, was made up largely from Mineral Resources, the annual statistical publication of the U. S. Geological Survey. The only other statistics we have for comparison are those of The Mineral Industry, annually published by the Engineering and Mining Journal. Previous to 1898, the two show only small differences. During the years 1898, 1899, and 1900, the latter reports a far larger production than the former, due to the fact that one of the Kentucky producers gave in much exaggerated figures. Since 1900 the figures in the latest Mineral Industry are those of the U. S. Geological Survey, except 1905.

TABLE III.

FLUORSPAR PRODUCTION IN THE UNITED STATES, 1896-1905.*

(In Short Tons.)

Year	United States		Illinois District.	Tennessee & Arizona Districts.	West Kentucky District.	Crude	Ground
	Quantity	Value					
1896	6,500	\$52,000	5,000	.....	1,500	.....	.....
1897	5,062	37,159	2,500	.....	2,562	.....	.....
1898	7,675	63,050	.....	.....	7,675	.....	.....
1899	15,900	96,650	8,400†	.....	12,500†	12,400	3,500
1900	18,450	94,500	8,450†	.....	15,000†	15,450	3,000
1901	19,586	113,803	6,086	.....	13,500‡	15,886	3,700
1902	48,018	271,882	18,360	628	29,030	43,310§	4,708
1903	42,523	213,617	11,413	275	30,835	36,888††	5,235
1904	36,452	234,755	17,205	151	19,096	21,031§§	15,421
1905	57,385(1)	362,488	33,275(2)	1,376 (3)	22,694(4)	49,852(5)	7,533

*Complied from Mineral Resources, U. S. Geological Survey, except when marked.

†Approximate.

‡Actual shipments.

§Includes 800 tons held in stock.

††Includes 6,550 tons held in stock.

§§Includes 4,671 tons held in stock.

(1) Excess of actual production, see "Comments on the Output."

(2) Over twice the actual production, Kentucky really having the largest production.

(3) Colorado and Tennessee.

(4) Slightly too high.

(5) Includes 2,437 tons held in stock.

The figures as given by Mineral Resources for the years 1902, 1903 and 1904 (also 1905, see Table III) are excessive, as will be seen by comparison of Tables III. and IV. The figures of the latter were compiled by the writer from the most authoritative sources accessible.* Placing the excess production of 1903, 1904 and 1905 at 2,000 tons each year, which was certainly not exceeded, and we still have an excess of 10,000 to 12,000 tons to be accounted for. These discrepancies in the U. S. Geological Survey figures are probably due to: (1) Receipt of padded returns from some of the operators. (2) Unintentional duplication of returns by adding to the figures of shipping companies the returns of producing companies who sell their product to the shipping companies; the latter companies always include their purchased product as well as their own. That considerable differences may arise from such duplication may be seen by comparing the number of producers and shippers in Table V. (3) The inclusion of shipments made by operators to their storeyards or between their storeyards.

*For details refer to Production of Lead, Zinc and Fluorspar of Western Kentucky, by F Julius Fohs, Chap. V., State Mine Inspector's Rept., 1903-1904, pp. 62-76.

TABLE IV.

GROUND, LUMP, GRAVEL AND TOTAL SHIPMENTS FROM WESTERN KENTUCKY, 1896-1906.

(In Short Tons.)

Year	Ground*	Lump	Gravel	Totals
1896	†	‡	1,500	1,500††
1897	†	‡	2,562	2,562††
1898	1,000§	‡	4,000	5,000‡‡
1899	1,500§	‡	5,000	6,500§§
1900	1,750**	‡	6,750	8,500§§
1901	2,065**	‡	11,435	13,500§§
1902	2,387**	‡	14,413	16,800** ††
1903**	3,130	8,942	7,453	15,122
1904**	3,421	2,390	7,306	12,978
1905**	5,220	2,470	11,461	19,151
1906**	4,319	904	6,570	11,793

*Production except for 1905 and 1906 which represents shipments.

†Unknown, included with gravel.

‡Included with gravel.

§Estimated.

††Mineral Resources, U. S. Geol. Survey.

‡‡Approximate.

§§Reported Illinois Central R. R. shipments.

**Statistics compiled by writer.

From Table IV. we also learn the extent of the production of ground fluorspar from Western Kentucky. By comparing with the total ground production given in Table III., we find this district, except in 1899 and 1904, to have produced from more than one-half to more than two-thirds of this grade. In 1904, according to figures from Mineral Resources, the total ground production was 15,421 tons. Deducting the Kentucky production of 3,421, we have a remainder of 12,000 tons to represent the production of the two Illinois mills, a production exceeding their capacity at that time had they operated continuously by 3,000 tons. Since these companies did not operate their mills more than one-third of the time during the year, as one had a strike on hand and the other was erecting its plant and doing development work, it is unlikely that the Illinois ground production exceeded much if any the Kentucky production of this grade.

In the table following the number of producers is given in the columns marked "Pr.," and number of shippers in the columns marked "Sh."

TABLE V.

NUMBER OF FLUORSPAR PRODUCERS AND SHIPPERS IN THE UNITED STATES, 1902-1906

Districts	1902		1903		1904		1905		1906	
	Pr. (*)	Sh.	Pr. (*)	Sh.	Pr. (*)	Sh.	Pr.	Sh.	Pr.	Sh.
Castle Dome, Arizona.....	2	2	1	1	1	1				
Central Tennessee.....	1	1	1	1	1	1	1	1	1	1
Colorado.....							1	1	1	1
Southern Illinois.....	5	4	5	5†	5	4	4	6	6	8
Western Kentucky.....	10	4	6	5	8	5	12	4	10	6
	18	11	13	12	15	11	18	12	18	16
Less companies shipping from two States.....				2		2		2	2	2
Totals.....	18	11	13	11	15	9	18	10	16	14

*From Mineral Resources.

†Mineral resources only reported 4. The writer is responsible for the other figures.

GENERAL REVIEW OF PRODUCTION IN 1905 AND 1906.

Western Kentucky and Southern Illinois districts continue in the lead as producers of fluor spar, with Central Tennessee and Colorado districts producing small amounts in 1906.

A larger amount was marketed in 1906 than in 1905, but the amount mined was less, due to conditions in Southern Illinois, where the shipments exceeded production by more than 5,000 tons, part of the shipments having been made from spar in stock. The Kentucky production was so regulated by the producers as to make the production about equal

the shipments. For the first time since 1897, the Kentucky production and shipments both fell below those of Illinois. In the production of ground fluorspar, however, the Kentucky district continues to hold first place. In Kentucky among the shafts that have not been regular producers heretofore there are no less than five that are now in such a state of development as to be capable of supplying, in 1907, an output greater than the total Kentucky production in 1906; while all the old mines, with one exception, are capable of turning out a greater production than at any time in the past. The Kentucky mines, indeed, are in position to supply any demand that may be made upon them in 1907.

Tonnage Marketed, Values, Etc.

The fluorspar marketed from American mines in 1906 amounted to 37,034 short tons, valued at \$211,231. This is an increase of 872 tons over 1905, but the value of the 1905 product, 8,314 tons, valued at \$82,576, were ground; 6,097 tons, valued at \$34,398, were in lump form; while of gravel there were 22,623 tons, valued at \$94,257. The following table gives the status of the industry, as to certain details, for 1905 and 1906:

TABLE VI.

COMPARISON OF STATUS OF FLUORSPAR INDUSTRY IN 1905 AND IN 1906.

(In short tons.)

District	Mined	Ground Marketed.	Lump Marketed.	Gravel Marketed.	Total Marketed. *	In Stock Dec. 31st.	Companies		
							Developing Not Marketing	Mining	Marketing
1905.									
Colorado & Tennessee . .	1,756	.....	1,676	.....	1,676	80	0	2	2
Southern Illinois.....	16,602†	2,313	3,816	9,206	15,335	0,762†	4	4	6
Western Kentucky.....	20,560	5,220	2,470	11,461	19,151	10,583	2	12	4
Total.....	38,918	7,533	7,962	20,667	36,162	17,425	6	18	10‡
1906.									
Colorado & Tennessee . .	620	.....	660	.....	660	40	1	2	2
Southern Illinois	19,532	3,995	4,533	16,053	24,581	2,975	4	6	8
Western Kentucky.....	11,440	4,319	904	6,570	11,793	10,455	3	10	6
Total.....	31,592	8,314	6,097	22,623	37,034	13,470	8	18	14
Increase in 1906.....		781	.....	1,956	872		2	0	4
Decrease in 1906	7,326	.....	1,865	.....		3,955			

*"Total marketed" represents gravel shipped, of which less than half was mined as gravel; the remainder having been mined as lump and crushed, while all the ground was mined as lump.

†Based partly on returns and partly on shipments.

‡The apparent error in total is not real, since companies shipping from two States were deducted.

Comments on the Output, Etc.

The Illinois operators undoubtedly supplied excessive returns to both the U. S. Geological Survey and the Engineering and Mining Journal for 1905, since they showed production and shipments double the real ones for that year. The statistics given by the U. S. Geological Survey for Kentucky were also excessive by a few thousand tons. Those reported for Kentucky by the writer in The Mineral Industry for 1905 were, on the other hand, under the actual total by a few hundred tons. A comparison of the large overestimated returns of Illinois producers with the prac-

tically correct ones for Kentucky producers was entirely unjust to the latter. The hurtful effect lay both in giving the Illinois district the name of yielding the largest supply, and in leaving the impression that in 1905 there was a considerable overproduction in the United States, which did not and does not now obtain. In 1905 Kentucky actually exceeded the Illinois shipments by nearly 5,000 tons.

The U. S. Geological Survey reports a production for 1906 of 40,796 short tons, valued at \$244,025, or \$5.98 per ton. According to the writer's figures, such tonnage and value are too high, the former being too high by fully 9,000 tons.

It was because of this state of affairs that special efforts were made to obtain for this Bulletin a correct statement of the shipments of 1905, and the returns presented in the foregoing table resulted.

The figures for shipments for 1906 result from returns of the transportation companies, carefully checked with those reported by the operators. It is gratifying to note that they tallied closely in the aggregate.

The reason Kentucky shipments dropped to second place may be summed up as follows:

1. Advantage of \$1.00 per ton in freight rates, given Illinois. In addition rebates also are reported as being given to Illinois shippers.

2. Illinois operators having cut prices in order to compete with the English, and also to undersell Kentucky operators.

3. The further invasion of the English shippers into the Western and Southern trade, previously largely controlled by Kentucky shippers.

4. The invasion of Illinois operators, for the first time, into Southern trade.

5. The partial retirement from the market of one of the large shipping companies, owing to caving of one of their Kentucky mines;* hence inability to produce.

*The extension of the mine inspection law so as to cover the spar and metal mines might have saved that mine. The value of the law to operators no less than to employes is recognized by an iron mining company in the State, which has asked that its underground workings be regularly inspected by the State Inspector of Mines.—C. J. N.

The Western Kentucky district has exported ground fluorspar both to Canada and Mexico, while crude fluorspar is also shipped the former. German consumers have sought quotations on Kentucky fluorspar in quantity, although in excess of 15,000 tons of fluorspar were exported by Germany in 1905, largely to Austria-Hungary and nearby countries.

COMPANIES PRODUCING AND SELLING FLUORSPAR.

The following companies were producing and selling fluorspar from Kentucky in 1905. Those marked with a star (*) sold to the consumer; the others to local companies: Big Four Mining Co., Drescher & Co., Givens Mining Co., Great Northern Mining & Milling Co., Kentucky & Indiana Mining Co., *Kentucky Fluorspar Co., Keystone Lead & Zinc Co., Keystone Mineral & Mining Co., Louisville-Marion Mining Co., *Marion Mineral Co., *Marion Zinc Co., and Wheatcroft Mineral Co. *Roberts & Co., made sales only. The Albany Mining & Investment Co. and the Senator Mining Co. produced but did not sell any of their product.

The companies producing and shipping fluorspar from Kentucky in 1906 (those which shipped to consumers being marked with a star) were as follows: *Albany Mining & Investment Co., Bluegrass Fluorspar Co., *Cumberland River Mining Co., Drescher & Co., Edwards Mining Co., Great Northern Mining & Milling Co., Kentucky & Indiana Mining Co., *Kentucky Fluorspar Co., *Marion Zinc Co., and J. M. Persons; *Marion Mineral Co., and *Geo. P. Roberts & Co., were shippers but not producers. Besides these, there were numerous others developing properties which did not ship or sell fluorspar during the year. Among these were the Eagle Fluorspar Co. and the Keystone Mineral & Mining Co. The list of shipping companies does not include ten or more agents who sell fluorspar for the above companies.

The producing and shipping companies in Illinois in 1906 were: *Crystal Fluorspar Mining Co., *Compton Mining & Smelting Co., *Cave-in-Rock Mining Co., *Evansville Lead & Spar Co., *Fairview Fluorspar and Lead Co., *Rosiclare Lead & Spar Mines, and the *Pierce Fluorspar Co.

The *Basic Chemical Co., *Geo. P. Roberts & Co., and *Marion Mineral Co. were shippers but not producers; while the Hamp Fluorspar & Lead Co., the Geo. W. Robinson, Spar, Lead & Zinc Co., and James Henry, were producers who made no sales in 1906.

*D. C. Roberts & Co. was the Tennessee producer and shipper in 1906; while *R. W. Blackett reported shipments from his property at Silver Cliff, Colorado. In Central Kentucky the Monitor Mineral Co., of Mercer county, is the only company developing fluorspar properties. No shipments were reported by that company.

GRADES OF FLUORSPAR.

Fluorspar is classed as lump, gravel and ground. Lump and gravel, spoken of together as crude fluorspar, may be had in three grades according to quality. Ground is to be had in four grades, but these are not correlative with the grades of crude fluorspar. In the term "gravel" it is now the usage to include both the gravel resulting from distintegration of lump through natural causes, and the crushed product of the mills. Gravel may be had washed or unwashed, although natural gravel alone may be had unwashed.

No. 1 fluorspar is usually white, less often slightly colored and should run 96 per cent. or more calcium fluoride, the remainder consisting of silica, iron oxides, alumina, calcium and magnesium carbonates, alkalies, hydrocarbons and moisture. Dark colored fluorspar, especially if somewhat shattered and iron stained, is not classed as No. 1, owing to the larger amount of silica it contains, such silica being deposited between the cracks in the weathering process. Colored fluorspar not so affected, if clear and highly crystallized, is not objectionable in this grade. Dark brown and purple black are not included in this grade at all, since they are usually charged with heavier and a larger amount of hydrocarbons.

American ground fluorspar all falls in the No. 1 grade, but is itself graded into three grades, namely, Extra No. 1, No. 1 and No. 2. A still lower grade of ground is obtainable in England, which is treated of under No. 3 fluorspar. No.

1 ground will run 98 per cent. or over calcium fluoride and about 1 per cent. silica. This grade is generally used where ground is called for. Extra No. 1 contains less than 1 per cent. total impurities, with very little silica, bringing several dollars more per ton than No. 1. This grade is produced from hand selected white lump fluorspar. While the bulk of that purchased by acid manufacturers is No. 1 (owing to the lower price), nearly all of Extra No. 1 also goes to such manufacturers. No. 2 ground will run from 96 to 98 per cent. calcium fluoride with up to 2 per cent. silica. This grade is of a darker color than No. 1, the off color being due to the darker colored fluorspar employed, as well as to a small amount of lead, an impurity pleasing to some glass makers. This grade is employed for cheaper wares by both the glass and enamel people. The bulk of the ground fluorspar demand is for No. 1 ground. Ground fluorspar is used, also, where a specially pure flux is needed. American ground averages 85 mesh in fineness.

No. 2 fluorspar will run 90 per cent. or over calcium fluoride with less than 4 per cent. silica, the remaining impurities consisting largely of calcite and sometimes limestone. Colored fluorspar, excepting unwashed red gravel, nearly all falls into this grade. The crushed product of the mills belongs to this grade. Some of the lump of this grade will go 95 per cent. calcium fluoride, when it may be classed as Extra No. 2. This grade is largely used for fluxing purposes.

No. 3 fluorspar includes, according to present usage, all fluorspar running between 60 and 90 per cent. calcium fluoride. Unwashed gravel belongs to this grade, as does fluorspar associated with a considerable amount of calcite, limestone, quartzite, barite, etc., also mill tailings. This grade is used as a flux in iron smelting, and especially where low priced fluxes are necessary. A grade of English ground may be classed as No. 3 ground. This corresponds in quality with the best of No. 3 fluorspar, running, it is reported, about 88 per cent. calcium fluoride.

The writer would suggest that the fluorspar classed now as No. 3 be divided into two grades, to be designated No. 3 and No. 4; No. 3 to include fluorspar running from 80 to 90

per cent. This grade would embrace most unwashed and not too dirty gravel; also lump fluorspar associated with not exceeding 12 per cent. silica in the form of quartzite, sand or chert, and from 8 to 15 per cent. calcite, limestone, etc. No. 4 would include all fluorspar containing 60 to 90 per cent. calcium fluoride, its silica content not to exceed 15 per cent., with the remainder made up largely of limestone, calcite, etc.; this grade would embrace the mill tailings and fluorspar largely associated with quartzite or limestone. Of what is classed here as No. 4, the demand is very limited. This grade would also embrace the artificial fluorspar by-product of cryolite.

SELLING PRICES.

Prices received for American fluorspar at mine shipping points are regulated by the quotations at Pittsburg, the Pittsburg quotations being partly controlled by the prices of imported English fluorspar. Quotations in New York are about \$1.00 more than at Pittsburg to offset difference in freight rates. For several years the English importations have practically controlled American prices. In 1906, however, American shippers entered into active competition with the English, making inroads into English trade in the East, where the English had previously nearly everything their own way. In retaliation the English sold fluorspar further West and in the South. This accounts for the slight decrease in the average price of the lower grades of American fluorspar in 1906, lower prices having been made for such grades in the disputed territory.

The ruling prices for fluorspar have remained practically constant for several years past. Occasionally a new company has offered fluorspar at a lower price and caused temporary flurries in the market, but such were only for some particular grade and left no permanent effect.

Table VII shows the highest, average and lowest prices obtaining f. o. b. cars mine shipping point, compiled from the Mineral Resources of the U. S. Geological Survey, for the years 1896 and 1905, inclusive. The averages reported for 1905 having been based upon exaggerated returns are all somewhat too high, while the extremes obtaining were in part both higher and lower than those reported for that year.

TABLE VII.

PRICES OF FLUORSPAR, 1896 TO 1905.

(Per Short Ton.)

Year	Average Crude	Average Ground	Total Average	Crude Lowest	Crude Highest	Ground Lowest	Ground Highest
1896			\$8.00				
1897			7.84				
1898			8.21				
1899	\$5.62	\$7.15	6.08				
1900	5.02	5.66	5.12				
1901	5.02	9.22	5.81				
1902	5.19	9.98	5.66	\$2.85	\$11.50		
1903	4.28	9.99	5.02	3.00	11.50		
1904	4.97	8.44	6.44	3.60	11.50	\$ 8.00	\$10.00
1905	5.33	11.00	6.32	4.00	8.00	10.00	12.00

The prices per short ton for 1906, reported received by American marketing companies for fluorspar in car load lots of 15 tons or more, were: Ground, \$8.90 to \$15.00; lump, \$3.85 to \$8.70; and gravel, \$2.50 to \$6.00.

Fluorspar for foundry purposes was retailed in quantities from 50 pounds to ton lots, usually barreled: Crude from \$10 to \$20 per ton; ground, \$20 to \$32 per ton. The smaller glass and enamel companies also purchase, at times, in small lots of from 1-2 to 5 tons. One company reported the sale of a ton of specimen fluorite at \$60.

The fluorspar from Colorado and Tennessee belongs to the lump class and the prices received were in the limits for that class in Kentucky and Illinois, although the average price received in the two former were higher than that received in the two latter districts. This was due to the higher quality of that sold from Tennessee and the proximity to market of the Colorado product. The differences in price between American grades No. 1, 2 and 3 crude, and also between the different grades of ground, vary from 50 cents to \$3.00 per ton.

Fluorspar of similar grade costs from 50 cents to \$1.50 more in lump form than as gravel, partly because of the high-

er cost of producing lump, and partly owing to the less silica content, since it is capable of closer control in grading than gravel.

The average prices received for American fluorspar, per short ton, in 1906, were: Ground, \$9.93; lump, \$5.64; and gravel, \$4.16. The average price of all grades was \$7.50.

Mining companies that do not market their own product sell the same to marketing companies at prices just sufficiently less than the prices above given to pay the marketing companies for handling such product.

Fluorspar, except ground and small lots of lump and gravel which are barreled or sacked, is usually shipped in bulk in closed cars. Owing to car shortage in the latter half of 1906, a small amount was necessarily shipped in coal cars. Boated fluorspar is usually barreled, except for barges, upon which it is shipped either in cars or loose in the barge. Barging between local points costs as much as 50 cents per ton, and in some instances more, exclusive of cost of loading. Freight rates vary according to distances and quantity, from \$2.00 to \$20.00 per ton, the latter price obtaining for small lots to distant points.

COMPETITION WITH AMERICAN FLUORSPAR.

The sources of competition are three in number: (1) Limestone flux, (2) imported fluorspar and (3) cryolite and cryolite products.

As to Limestone Flux.—A little more than 50 per cent. by weight per ton of pig iron produced is the amount of limestone flux at present consumed. During 1905 it has been estimated that 13,220,000 tons of limestone were used for flux in the iron and steel industry, while 357,000 and 521,000 tons respectively were used in lead and copper smelting. For the former the cost of limestone flux is 45 cents, while for copper and lead it is 90 cents per ton. While in present practice it would not be practicable to substitute fluorspar entirely for limestone as a flux, yet in many cases this can be done to advantage, while in practically all other cases it can be used in connection with limestone to much better advantage than the limestone alone, at equal or less cost. One

part of fluorspar is said to go as far for fluxing purposes in practice as ten parts of limestone. The cost of fluorspar in 1906 did not exceed more than eight times the cost of limestone flux for iron and steel nor more than four times that for lead and copper. A steady increase is notable for several years past in the use of fluorspar as against limestone flux so that at present the amount consumed in smelting is one-half of one per cent. of the amount of limestone flux used. There is no reason why the percentage should not greatly increase when it becomes better known that fluorspar is much the more powerful flux, reduces fuel consumption, increases percentage of metal obtained, and acts as a detergent, yielding metal of better quality; in addition, it means the handling of several million tons less of raw material, thus reducing the amount of storage space and labor required.

Lead ore containing 5 to 10 per cent. fluorspar shipped from the Kentucky-Illinois district is not assessed a penalty, for the fluorspar is distinctly an advantage to the smelter as a flux. In copper smelting it is also an advantage.

As to imported Fluorspar.—The imported English fluorspar has been a source of competition of considerable importance for several years. As the Treasury Department keeps no record of such imports we do not know their amount though they probably reach 30,000 short tons. The low price demanded for English fluorspar is due to: (1) The low cost of securing the product from the old dumps of the Derbyshire lead mines: (2) the low cost of mining the gravel by means of steam shovel in large open pits: (3) the low cost of ocean steamer freights, the product coming over as ballast in the holds of vessels, at a cost, it is said, of \$1.75, and costing but 75 cents additional to bring it from the mines to the ocean port, making a total freight cost of \$2.50 to land it at American ports: (4) the low freight tariffs granted the product from seaboard as far west as Pittsburg, the published rate for which is \$2.60, while it is said that through rebate, the cost to English shippers has only been \$1.60 per ton: (5) the admittance of fluorspar duty free at American ports. During 1906, as already pointed out, American producers entered into active competition with the English, and the

There was shipped 144,518 lbs. of galena in 1905, an increase of 21,982 lbs. over 1904. The small shipments were produced as a by-product by the Kentucky Fluorspar Company, Drescher and Company, and Blue & Nunn.

An increase of 37,325 lbs. is to be noted for 1906, over 1905, the shipments in 1906 amounting to 181,843 lbs. The shipping companies were: Kentucky Fluorspar Co., Sanders Ore Separating Co., and the Marion Zinc Co. The Southern Illinois lead shipments and production were considerably in excess of those of Western Kentucky both in 1905 and 1906.

In 1906 Illinois lead concentrates shipments amounted to 430.4 tons with a reported silver content of from $3\frac{1}{2}$ to 11 oz. per ton. The reported estimated amount of lead or ore on hand ready for shipment from Illinois mines at the end of 1906 was 170 tons.

While zinc had been discovered as early as 1835 in Western Kentucky, no deposits were worked to recover zinc till in May, 1901, when Blue & Nunn made their first shipments of zinc carbonate from the "Old Jim" mine. Thousands of tons, largely carbonate, some sulphide, were mined from an open cut, the mineral being gotten practically from the surface to a depth of forty feet, on either side of an igneous dike, the deposit in places exceeding 50 feet in width. The ore was hand cleaned; the pea ore product washed with log washer, and the sand ore cleaned on two Overstrom tables. The largest shipments of zinc ore from the district were made in 1902, the product being all from this mine.

Small shipments of sulphide were made by the Western Kentucky Mining Company from the Lanham shaft of the Columbia mines, in 1901. Their successors, The Columbia Mining Company, made no shipments in 1902, when they erected the Columbia mill for concentrating lead and zinc, from which they shipped several carloads of zinc, both in 1903 and 1904.

The Mann zinc mine was discovered in 1901, and the Marion Zinc Company made small shipments from both the Mann and McDowell mines, which adjoin, in 1902, and, while they have been operated some since, owing to litigation in connection with the Mann mine no further shipments have been made. The Old Dad mine was opened in 1903, and

shipments of zinc carbonate were made from it in 1903 and 1904. This was in part hand-cleaned, and in part washed with log washers. The Henderson Company also made small shipments in 1903, from their Lady Farmer mine which adjoins the Old Jim, which received treatment similar to the latter, making shipments also in 1904. Blue & Nunn made some shipments in 1904 from the Nine Acres mine. Part of this ore was hand-picked, part hand-jigged, and part put through the Columbia mill. A number of deposits were somewhat exploited in these years, from which no shipments were made, owing to lack of milling facilities.

Only 403.8 short tons of zinc ore were shipped in 1905, of which 126 tons were sulphide and 277.8 tons were carbonate. These shipments showed a decrease of 555 tons from that of 1904. The decrease is attributable to the fact that the Old Jim mine was idle during the year except for a little development work, this mine having previously supplied the bulk of carbonate and part of the sulphide ore.

The Old Dad mine was the largest zinc mine producer during 1905, but, because of a large amount of development work in progress, the production was small. The fact that some of the more important zinc mines were idle, or only a little development work was being done at them, also accounts for the decrease in tonnage.

Among those who made small shipments of zinc ore in 1905 were, Blue & Nunn, Watkins & Drescher, The Henderson Company, and the Marion Mineral Company. A small amount was produced which was not put on the market.

In 1906, the zinc production was even less than 1905. Although some new carbonate deposits were opened, little of such carbonate was shipped. (See finds at Old Jim Sinkholes and Lady Farmer, under "Progress in 1906.") The Old Dad was able to get out scarcely any ore owing to caving of the 60-foot open cut, which had to be recaught before further extraction of ore was feasible. The Old Jim mill was re-erected at this time and some nice concentrates from zinc dirt obtained. There was a small shipment from the Hodge open cut as well as from the Old Jim. In the matter of sulphides, the first shipments of zinc separated from fluorspar zinc ores are to be recorded, a distinct advance, auguring

well for increased shipments in 1907. These were from the Sanders mill, discussed on a subsequent page. As a result, two companies have been organized to re-open the Columbia and Nine Acres mines, and a mill is to be erected equipped with Sanders separators at the latter. Other developments tending to increase the zinc production are to be looked for, and altogether the outlook is bright.

The total zinc ore shipments from the district to date are:

	Short Tons.
Zinc sulphide or sphalerite -----	1,164
Zinc carbonate or smithsonite -----	8,953
Total zinc ore -----	10,122

In the same period, the shipments of zinc ore from Southern Illinois were comparatively small. In 1903 or 1904, the first small carbonate shipments were made from the Empire mine. No carbonate was shipped in 1905, but in 1906 four companies made shipments aggregating 103 tons, and in addition a small amount remains unshipped. No sulphide shipments other than small lots to be used in separating tests have yet been made.

Shipments of lead and zinc ores from Western Kentucky by years are shown in the following table:

Western Kentucky lead and zinc shipments, 1901-1906.

	Galena.	Zinc Sulphide.	Zinc Carbonate.
1901	-----	50,000	3,154,000
1902	-----	116,000	7,462,100
1903	83,152	1,300,000	3,155,800
1904	122,536	506,800	1,410,800
1905	144,518	252,000	555,600
1906	181,843	103,400	176,600

The work of the State Geological Survey has demonstrated the probability of finding zinc deposits along the most sheeted portions of the master faults and such parts of them where the fluorite pinches; also along sheeted zones parallel, to or complementary of the master faults. In general, where the master fault carries the most zinc the complementary will carry a larger amount of fluorspar and vice versa. Also, that the chance of finding zinc carbonate resulting from the

erosion of limestones having sheeted zones is good, and further development along these lines is advisable, that is, more surface cross cutting in the red clay residual from the decomposition of limestone walls of master faults should be made for distances up to 200 feet or more from such faults.

Barite.

Barite (barytes, barium sulphate) was first shipped from the district in 1903, when the Marion Zinc Co. shipped several carloads from their Ray and Lowery mines, 2 miles east of Fredonia, in Caldwell county. No work of consequence was done at these mines in 1904 or 1905. In 1906, further open-cutting was done and a log washer for cleaning the barite was installed. A small tonnage was reported shipped, while they have several hundred tons of off color gravel yet to be cleaned for shipment. The hacked lump product of these mines is high grade. It is reported that the company intends to erect a mill for bleaching and grinding barite at an early date.

In 1905, a new deposit of barite of considerable size was found on the property of the Kentucky Fluorspar Co. at the Commercial shaft on the Tabb lode, where the vein appears over 20 feet in width.

Some of the barite of the Western Kentucky district is of the best grade, while a part of it has its value reduced by a small amount of fluorspar occurring intergrown with it. In general the barite in the smaller veins that show little or no faulting, with limestone for one or both walls, shows where fluorspar is at all associated a large per cent. of the latter while that of the larger faults shows only fluorspar in small amount associated.

The production of barite in the United States for 1904 was 65,727 short tons, valued at \$174,958, while in 1905 it was 48,235 tons valued at \$148,803. The average price per ton was \$2.66 and \$3.08 for 1904 and 1905 respectively.

Calcite

A small tonnage of calcite was reported as shipped for fluxing purposes by the Schoolfield-Spees Mining & Milling

Co., from the Tom Spees mine both in 1905 and 1906. These were the first calcite shipments from this district. The product was barreled and was shipped by the Ohio.

Calcite occurs in narrow veins alone or as bands of the master faults lining the limestone walls from 3 to 12 feet in width. It is also found along the faults cutting out ore or fluorspar at times. As the calcite deposits are of very considerable purity, usually gray or white in color, there is no reason why those nearest transportation should not be exploited and the product put on the market, there being an increasing demand for this product. It is used for fluxing purposes, for purification of wood alcohol, for Portland cements, for lime, for certain chemical compounds, etc.

Firesand or Fireclay.

The only shipments of this product have been made by the Western Clay and Mining Co., from their Stevens Tunnels, 12 miles southwest of Marion. The shipments from 1903 to 1906 aggregate 6,163 short tons. No shipments were made in 1905 and the shipments in 1906 were small. The products contain 91 to 93 per cent. silica (in part, perhaps, colloidal), 2 to 3 per cent. of alumina, 0.5 to 1.5 per cent. of iron oxides, the remainder consisting of calcium and magnesium carbonates and alkalies. It is procured from between walls of a large fault, one wall of which is Chester quartzite, and the other St. Louis limestone, the width of the deposit reaching 35 feet in places; the deposit is proven to a depth of 120 feet and for nearly 400 feet in length. It results from the disintegration of the quartzite, and in part from that of the cherts, the disintegration having partly resulted from frictional brecciation, in part from chemical decomposition.

Several other deposits of similar character have been developed. Two in Crittenden, at the Anderson Jones and Mayflower (Jim Croft) shafts, while another was reported opened at the Bush prospect on the John Franklin place adjoining the Jones; all of these are 9 to 10 miles west of Marion. One was opened in Livingston county on the Angling place, several miles east of Smithland.

Deposits similar in composition but of entirely different origin have been worked by the Western Clay and Mining Co. at Smithland, and considerable shipments made; such are, however, not included in the above aggregate.

Fluxing Clay.—Small shipments were made in 1906 for the first time from Kentucky of the red clay such as occurs in connection with the zinc veins at the Old Jim mine, and is also found with fluorspar veins where the limestone walls decay and red clay results. Shipments were made by Blue & Nunn. The product is used in connection with fluorspar, etc., for fluxing, the aluminate of iron it contains being used to reduce the fusing point as does thermit. Shipments, small in quantity, were also made from Illinois mines of this product.

OTHER VEIN STUFFS IN CENTRAL KENTUCKY.

Barite, Lead and Zinc Developments in 1905 and 1906.

Data in regard to fluorspar in the Central Kentucky District are given in Chapter V. During the last two years, especially in 1906, a number of companies have been developing prospects on the barite, lead and zinc veins of the district—some of the prospects showing excellent mineral—and several have been mining for the market. Shipments of barite and galena have been made; also of refined (precipitated) barium sulphate (blanc fix), with by-products of sodium sulphide and lead fume. Efforts were made to collect statistics of production but without avail, since few of the companies were willing to furnish the necessary data. To those gentlemen who did respond to requests for information, the sincere thanks of the Survey are tendered. It is hoped that with another year all companies will agree to furnish statistics.

Up to the end of 1906, the Mutual Mining Co., of Scott county, was the only manufacturer of barite products. The Ohio Lead Mining Co. and the Lead Mining Corporation of America, of Owen County, the Union Mining Co., of Henry county, and the Jessamine Barytes Co., of Jessamine county, also have mills. Of the four, only the Union Mining Co. turned out any lead concentrates during the last two years. The

first three have operated chiefly for lead. The Jessamine mill has only recently been completed; it will turn out crushed and ground barite, and is provided with bleaching vats. The Clinch Valley Barytes Co. expects to begin operations near Lancaster, Garrard county, at an early date. Some shipments of crude barite have been sent to Virginia from Garrard county. In Anderson county, the Barium Mining Co. was preparing to develop barite deposits during 1907. In Bourbon, the Kentucky Mining and Developing Co. began operations near Millersburg. The outlook for a large output of barite and associated minerals from the Central Kentucky District is promising.

Following is a list of companies that are or have been prospects:

Anderson county.—Barium Mining Co., Lawrenceburg, R. F. D. No. 3. Head office, 51 Perrin Building, Cincinnati, Ohio. W. D. Beggs and Thos. Jouvett.

Bourbon county.—Kentucky Mining and Development Co., Millersburg. General office, 519 Madison Avenue, Covington, Ky. Lead and barite.

The Clay prospects, on lands of Hon. Cassius M. Clay, near Paris. Barite, galena, sphalerite. In Bulletin No. 2, Prof. Miller reports twenty veins on Mr. Clay's lands. Several shallow prospect shafts have been sunk on the veins.

Daniel Isrigg prospect, Paris. Two shafts were sunk on the vein, one of them to a depth of about 100 feet, but no mining has been done within recent time. Barite, galena and sphalerite.

Clark county.—(See Fayette county.)

Fayette county.—Dolan prospect, on land of Joseph F. Dolan, about seven miles northwest of Lexington. Barite with sphalerite.

Morton's Mill prospects, two veins. The most important Detail surveys, which the writer had in charge, were one crosses Boone's creek, about a mile above the mill, into Clark county. Two prospect shafts have been sunk on the

latter, one in Fayette and one in Clark, the latter being about 100 feet deep. Fluorite calcite and barite, with traces of sphalerite.

Potter's Field prospects, on the old Potter's Field property and exposed in cuts of the Belt Line and Lexington & Eastern railroad, Lexington. Barite.

Russell's Case prospect, about seven miles northeast of Lexington. Some years ago a shaft about 200 feet deep was sunk on the vein, the object being to mine for lead alone. Barite with some galena.

Franklin county.—Judge W. S. Pryor, Frank K. Kavanaugh, and others, of Frankfort, have opened prospects on Flat creek, about a mile from the Kentucky river. Some small shipments were made for testing purposes. Barite, zinc and some galena.

Camp Pleasant Mining Co., Stamping Ground, R. F. D. No. 2. Home office, Hillsboro, Mo. Thos. J. Jett, President; W. W. Jones, Superintendent; F. H. Brown, Secretary. Barite, galena and zinc.

Garrard county.—Clinch Valley Barytes Co., Lancaster, Ky., and Honaker, Va. Chiefly barite.

Dix River Mining Co., Stanford. Chiefly barite and zinc.

Harrison county.—Lair prospects, on L. & N. railroad, three miles southeast of Cynthiana. Some prospecting was done on the vein, barite with some galena, some years ago. No mining has been done in recent time.

Hoggin prospects, on L. & N. railroad, one mile south of Lair. A small amount of prospecting has been done. Barite with galena showing in streaks.

Henry county.—Boston & Kentucky Mining Co., Lockport, A. E. Place, Secretary. Lead and barite.

Lockport Mining Co., Lockport. Lead and barite.

Union Mining Co., Lockport. General office, Madison, Indiana. Lead and barite.

Jessamine county.—Jessamine Bartyes Co., Nicholasville. Chiefly barite. This company is acquiring barite holdings in other counties.

There are a number of prospects in this county, but it is not known at the moment who the holders now are.

Mercer county.—Monitor (formerly Chinn) Mining Co. The company owns or controls several veins, including fluorite, calcite and barite deposits. Its Twin Chimneys and Fantail mines have been referred to in the account of fluorspar mines. Its great Green Million calcite vein, so far as it has been tested, shows very pure calcite with no metallic minerals to affect its quality.

Owen county.—Lead Mining Corporation of America, Hoosier mine, Moxley. Barite with considerable galena. It is understood that this company has made no output during the last two years. The plant includes crusher and concentrating tables.

Ohio Lead Mining Co., Gratz mine, Gratz. General office, Portsmouth, Ohio. Lead and barite.

Twin Creek Mining and Smelting Co., Cantor mine. Chiefly zinc and calcite. P. O., Owenton, care of Hon. J. W. Cammack. There was no output during the last two years.

Scott county.—Mutual Mining Co., Stamping Ground. W. S. Kissinger, Manager. The company controls several barite veins carrying galena and zinc, in both Scott and Franklin counties.

Woodford county.—A number of veins occur in this county, the best known, which have been prospected to some extent, being the following: The Fairecloth, of fluorite; the Shryock Ferry, of barite with some calcite and blende in its upper extension, changing to calcite (chiefly) with some blende below; the Shropshire, of barite with some sphalerite; the Prewitt, of barite, with a little galena and blende and some fluorite; and the Withrow, of barite with galena.

(It should be understood that the foregoing list does not by any means purport to be a complete catalogue of the barite and fluorspar occurrences in Central Kentucky. The list is given merely as indicative of what may be expected from the district. It is intended that a complete examination of the district shall be made by Mr. Fohs during the season of 1907, and a special Bulletin will be issued on the barite deposits of the State.—C. J. N.)

V.

**THE FLUORSPAR INDUSTRY
IN 1905 AND 1906.**

[Abstract from Bulletin No. 9, Kentucky Geological Survey; Fluorspar Deposits of Kentucky, by F. Julius Fohs.]

Progress of the Fluorspar Industry in 1905.

Practically all the mines at work in 1904 were operating in 1905, with a number of new ones. Quite a number of new deposits were encountered in the exploitation of the old mines, and in this respect the year showed a marked advance. A number of new mills were erected, and the condition of the industry generally was favorable.

Western Kentucky District.—The widest vein mined in this district during 1905 was 36 feet of gravel fluorspar, at the 145-foot level of the Pogue mine. The widest lump vein was 16 feet at the John mine. At the Mary Belle mine two new veins were encountered, and one of the shafts showed 15 feet of fluorspar with galena associated.

Among the new producers was the Kentucky mine, which has a 12 to 20-foot vein of gravel fluorspar in the upper levels, and 10 feet of lump in the lower one. This mine, together with the Matthews with which it is connected, produced a good tonnage during the year.

The New Memphis incline gave up to 12 feet of No. 1 lump at a depth of 75 feet, while the old Memphis continued to turn out a large amount of No. 1 fluorspar.

The Keystone mine, with a good vein up to 12 feet wide, carrying some galena; the Wheatcroft, and a new shaft on

the Tabb land, may be mentioned among others as having large veins producing in 1905, while the veins of 6 feet or less were numerous. Among new deposits may be mentioned those opened on the Ben Belt, Brown, Cox, Senator and Parish properties. The last named is a large flat deposit about fifty feet thick, replacing limestone near a fault.

Among developments of special interest in the matters of lead and zinc, are the finding of a 3-foot vein of almost solid galena (a small per cent. of fluorspar only being associated) at one of the shafts of the Mary Belle mine; also of a good vein of zinc ore, carbonate in the upper part and coarse grained sphalerite below water level, associated with a little fluorite and calcite, at the Eclipse mine (formerly the McMiccan prospects); of an 8-foot sheeted zone of lead and zinc sulphides, with a little fluorspar and calcite associated, at the John mine about 50 feet east of the main fault at the 247-foot level. The Hodge zinc shaft was cleaned out and some work done; here the zinc occurs in quantity, replacing oolite.

One new deposit of barite of considerable size was found. This at the Commercial shaft on the Tabb fault zone, where the vein appears over 20 feet in width. Calcite was mined at the Spees mine in Livingston county, from a secondary replacement zone of the Jamieson fault zone.

executed by the Kentucky Geological Survey during the year, and a deal of new and valuable data relative to the deposits and industry have been brought to light and will be published at an early date by the Survey.

Two preliminary railroad surveys were executed with a view of putting a belt road into the mining field.

Milling in the Western Kentucky District.—So far as the writer is aware, no fluorspar milling is being done except in the Western Kentucky and Illinois districts. Some lump was shipped in previous years, to be ground elsewhere, but now the ground product is largely shipped direct to the consumer. The year has certainly seen the largest tonnage of ground fluorspar both produced and shipped, ever known. That shipped from one mill in Western Kentucky exceeded the total output for the previous year.

No changes are to be noted for the Kentucky mill. The Nancy Hanks mill, erected by the Albany Mining and Investment Company, has just been completed. It is situated at their Nancy Hanks mine, near Salem, Ky. This mill, like most of the others of this district, follows somewhat the Joplin pattern, but differs in the installation of a rather complete sizing system, using a new type of shaking screens, the Ratcliffe-Cohenour patent, and a separate four-cell jig for each size. The problem is to concentrate the fluorspar and galena.

The erection was begun of a new grinding plant at the John mine, about eight miles southwest of Salem, Ky., in 1905, but, owing to the burning of the mine and mining plant, and the necessity of first putting it again in shape, it was not completed in 1906, though it is reported that the Cumberland River Mining Company intend to complete it early in 1907.

The new Eagle mill, near Salem, was practically completed this year, and the building for the Sanders mill is about ready for the installation of machinery. The aim of these mills is the separation of the sphalerite (blende) from the fluorite so as to produce a commercial zinc ore, and at the same time save the associated galena. The former is a dry concentration plant, using Hooper Pneumatic tables, and a very complete sizing system.

The National Mill was not in operation during the year. The Seacoast Mill at Paducah, using Krom tables, was not successful in handling Kentucky-Illinois district mixed ores, and was removed to Madison, Indiana, the early part of the year, where it will be used on the galena-barite ores of Central Kentucky, of which it makes a fair concentration.

Southern Illinois District.—The Fairview mine was sufficiently developed by the early part of 1905 to make it capable of turning out 50 tons daily, this in operating its 211 and 270-foot levels, and giving it the record for daily production. An idea may be obtained of the large amount of fluorspar this mine is capable of producing since it maintained a width of six to thirty feet for over 500 feet without showing any evidence of decrease. The product shows no change in the lower level. A sufficient amount of galena is secured with

the fluorspar to more than pay the running expenses of the mine and mill.

The Rosiclare output was about 25 tons daily while running, secured from the 300-foot level, where the vein shows no change in character beyond the usual pinches and swells.

At the Black (or Mary) mine near Bay City, where a number of small veins had been previously opened, a 12-foot vein, carrying fluorspar and galena, was encountered, placing it in the list of producers for 1905. Some shipments were made from the Lee Mine. Here there is an exceptionally wide vein of gravel fluorspar.

Milling in Illinois.—The Fairview mill was remodeled in the early part of the year and the capacity increased. Cooley jigs and a Wilfley table were installed to replace the jigs of the Hartz pattern. The lead concentrates of the plant are considerably cleaner than those made previously, but the fluorspar product is not improved, and No. 2 product is turned out, crushed in two sizes. At the time of the writer's visit the daily capacity of the mill for concentration of fluorspar and galena was said to be about forty tons, while the grinding division handled about 100 barrels per day. The capacity, however is being increased.

No changes were made at the Rosiclare mill. The Compton Mining & Milling Company started the erection of a mill of the Joplin type at their Mary mine, for separating fluorspar, lead and quartzite.

Central Kentucky District.—The Monitor (formerly Chinn) Mineral Company continues development work in Mercer county, at the Twin Chimneys mine, some work also being done at the Fantail mine. At the former, the shaft is being deepened; at the latter, a crosscut tunnel is being driven; the vein consists principally of fluorite. At the Twin Chimneys the vein averages about four feet. It is banded for the most part symmetrically, fluorite, barite, and calcite occurring in separate bands, varying from an inch to a foot in width. While barite forms only a very small part of this vein at this mine, there are many veins in this district that consist chiefly of barite, some of which will be operated

the coming year. The shaft at the Twin Chimneys has been sunk deeper since the writer's visit, as Prof. Norwood, who recently examined the mine, says they are now 225 feet deep (80 feet below the adit) and the vein in the bottom is five feet in width largely fluorite and calcite with but little barite, with the walls of Camp Nelson ("Chazy" of Linney) limestone. Some of the veins of this section have been briefly noted in Bulletin No. 2 of the Survey.*

Milling in Central Kentucky.—A mill for the separation and grinding of fluorspar, barite and calcite is promised for the Central Kentucky District. According to information given by the engineer in charge, the Monitor Mineral Company has let a contract for the mill, the work to begin on it in February. Its equipment is to consist of a picking table, two crushers of the Blake type, three sets of Cornish rolls, two four-cell differential jigs, sizing screens, accessory elevators and conveyors, a Ford concentrating table, one rotary dryer, one Griffin mill (with provisions for two) to grind the fluorspar, and eight buhr mills of Virginia buhr stone for grinding the calcite and barite. An additional section of the plant is to be constructed to manufacture barium salts. Later, the calcite, in part, is to be utilized in the manufacture of hydrated lime and sand-lime brick at the mine.†

Central Tennessee District.§—Two properties were operated in the latter part of the year. The Foley mine is situated about eight miles west of Carthage, in Smith county. Here, near the surface, massive crystalline fluorspar occurs in boulders weighing from 10 to 1,500 pounds in a limey clay. In sinking the shaft 25 feet of limestone were encountered, immediately below which is an eight-foot vein of fluorspar dipping 10 to 12 degrees west and striking northwest. Crystallized calcite, very similar in appearance to the fluorspar, lines the foot wall which consists of a gray lime-sand or clay resulting from the disintegration of the limestone. The fluor-

*Miller, A. M., The Lead and Zinc Bearing Rocks of Central Kentucky. Bulletin No. 9 Kentucky Geological Survey, 1905.

†Statement given the Director of the Survey by the engineer in charge.

§Private Communication, D. C. Roberts.

spar is said to average 98 per cent. calcium fluoride. This may be a blanket vein originally replacing the limestone, similar to those in the Western Kentucky and Southern Illinois districts, occurring in close proximity to a vertical vein.

The Alcorn property about eighty miles east of Nashville, on the Tennessee Central, was also being developed.

Here yellow, crystallized fluorspar occurs, covering the ground within a foot or two of the surface. Some thirty tons have been mined from surface picking. Sinking has failed to locate the vein, though fluorspar is found to fill the limestone crevices 8 to 10 feet below the surface.

Similar fluorite is reported from the vicinity of Nashville.

Colorado District.—Fluorspar was mined and shipped for the first time in Colorado, at Jamestown, Boulder county, in 1905. It was obtained from strong veins in Algonkian crystallines associated with andesite intrusions of later date. Open cut methods were employed.*

Castle Dome District, Arizona.—This district, while on the list of producers, has not made any shipments for the last two years.† It is reported that there are thousands of tons of crude fluorspar on the dumps. It is secured here as a by-product from the mine, as is necessary to facilitate the mining.

That previously shipped from this district, it appears, was largely used in the manufacture of Portland cement by California plants. According to information received from Mr. E. C. Eckel, its use for such purposes has been discontinued. The lack of demand for the Arizona product may thus be accounted for, there being at present no other industries in the immediate section for which it is used.

*Hovey, E. O., Fluorspar and Cryolite. Extract from Mineral Resources, United States Geological Survey, 1900, p. 4.

†Private communication from Robt. D. Luce, Superintendent Castle Dome Mining & Milling Company.

Progress of the Fluorspar Industry in 1906.

The year 1906 found the same districts producing fluorspar as in 1905, except in Colorado, where the Silver Cliff district became a producer and the Boulder district left the list. Many new developments, both in mining and milling, are to be recorded.

Western Kentucky District.—The Kentucky Fluorspar Company, with mines in Crittenden county, has to its credit the largest amount of development work.

In a new shaft at the Brown mines, a vein more than 4 feet thick of fluorspar and zinc carbonate was secured. At the Hodge mines, exploitation work on all three veins was in progress, and a large central power plant is shortly to be erected. The Meeks Incline, on the most southerly vein, has six feet of white fluorspar and galena of the beautiful ribbon structure type. On the main Hodge, work was done in the Air Shaft; zinc carbonate was mined from surface cuts, and a considerable body of gravel fluorspar was mined at the Reed cut. On the Jones vein, at the Holly mines, 4 feet of fluorspar were cut in the main shaft. Gravel was mined on contract on the Redd and Klondike veins. A new vein, strike N. 25 degrees E., of purple fluorspar was discovered 50 yards southwest of the Klondike vein. The Memphis Incline showed an ore shot 14 feet wide, largely No. 1 fluorspar. A neat an ore shoot 14 feet wide, largely No. 1 fluorspar. A neat fluorspar is being mined at one-half its former cost. The present output will be increased upon the opening of new levels, sinking for which is now in progress.

From maps and sections prepared by Mr. C. S. Nunn, the president, (see accompanying plate), it is evident the Memphis ore shoots pitch to the right, looking down the dip, agreeing with Clayton's law.* They pitch 28 to 30 degrees from the horizontal, and this pitch corresponds with the direction of secondary slickensiding in the fluorspar, while the slickensiding of the walls dipped about 87 degrees. The

*Clayton's law is, briefly, that "ore shoots pitch to the right as seen when looking down a lode along its dip." Its general application is questioned, but when found applicable to a district it is of great assistance in exploiting the local ore deposits.—C. J. N.

amount of displacement of the Memphis fault is $70\frac{1}{2}$ feet. The larger ore shoots (3 feet and over) of which there are two, vary from 30 to 90 feet in length and are 120 feet apart. Bordering these are narrow sections merging into barren sections (20 to 45 feet long) beyond, while half-way between the large shoots is a narrow shoot.

At the John and Nancy Hanks mines the ore shoots also pitch to the right, while at the Nine Acres they pitch to the left.

Immense gravel shoots on either side of the Kentucky mine were stoped; to the south, the Milliken shaft was sunk almost entirely in gravel getting white lump on one side. In sinking on the Yandell incline, nice white fluorspar was encountered at 115 feet depth.

The main fault was cut at Glendale, showing at this and the Leona mine 10 to 16 feet of galena-charged fluorspar. New openings were made by the Blue Grass Fluorspar Company on the Tabor and Asbridge, and small power plants were installed. The vein in these at 80 feet varies from 4 to 12 feet gravel and lump, showing locally a deal of galena. At the Wheatercroft, a secondary vein of purple fluorspar was cut.

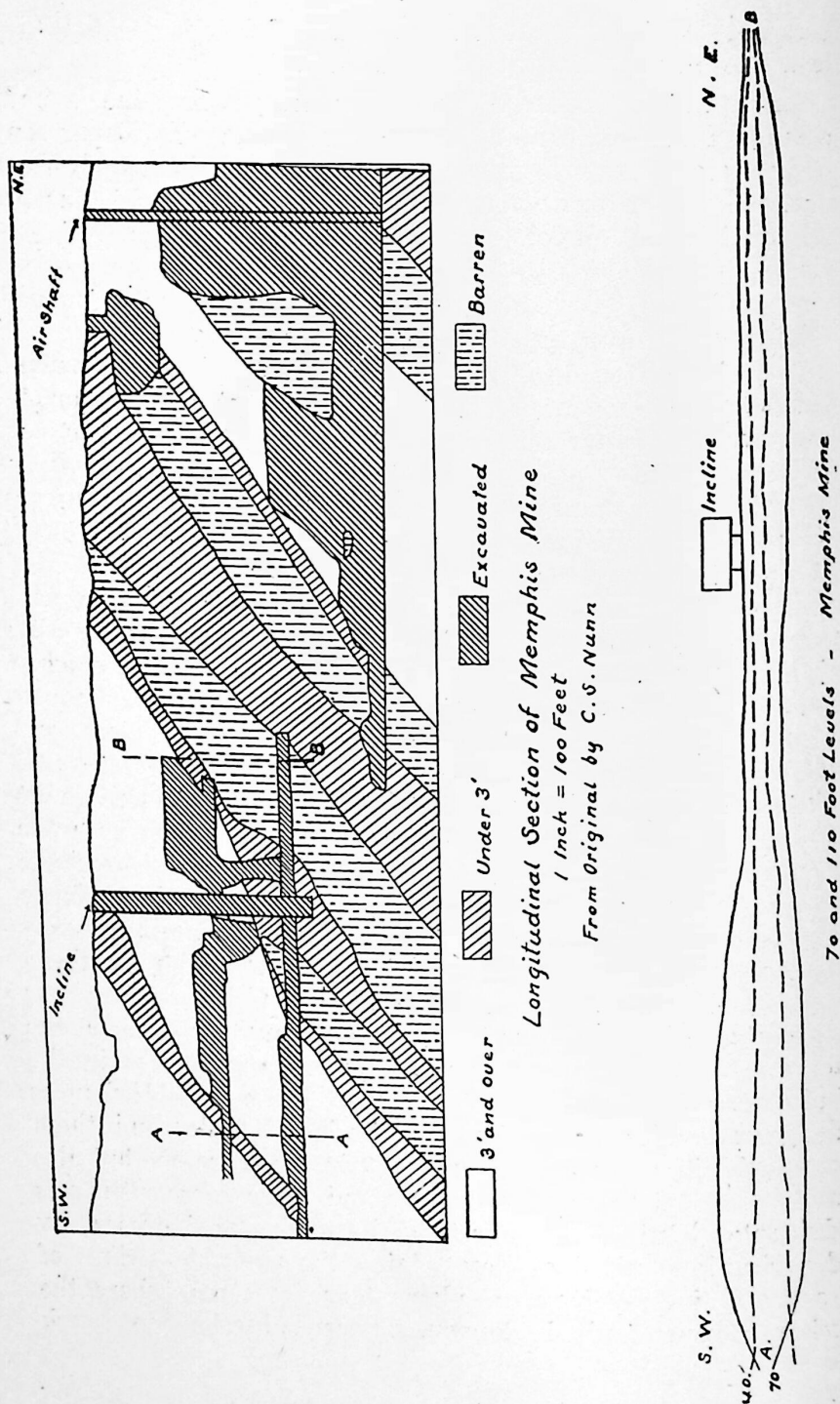
On the Columbia fault zone, a 3-foot vein of zinc carbonate, was secured on the Wilson land; while at the Ada Florence, at 132 feet, a good vein of fluorspar-galena was found near the shaft, which, a short distance southwest, changed to zinc sulphide and galena with only 2 per cent. fluorspar. A compressor, etc., were installed here. Arrangements are being consummated for reopening the Columbia mine under new management. Developments were in progress on the Memphis fault zone; also at the Edwards, Thurman and Eclipse. The latter has $2\frac{1}{2}$ feet of jack, and is equipped with a small air plant. Fluorspar 2 to 4 feet wide was cut in contact with a mica-peridotite dike at the Will La Rue prospect. Veins of fluorspar, showing well in lead, are reported opened at the J. O. Belt and Ed Flanary. At the Riley, several levels were operated, and sinking continued below 200 feet. New shafts are being sunk at the Parish and Leander. At the Silver Star, a $3\frac{1}{2}$ foot fluorspar vein was cut. A new vein of zinc carbonate was discovered at the Old Jim Sinkholes, while both carbonate and sulphide were secured at the Lady Farmer.

Carbonate was mined at the Old Dad, and considerable 8 per cent. zinc dirt secured at the Red Hill.

In Livingston county at the Evening Star mine, a body of ore 12 feet wide was cut at 120 feet, carrying 20 per cent. sphalerite, 5 per cent. galena, and the remainder chiefly fluor-spar. The mine is now capable of an output of 50 tons per 168 and 180-foot levels. A lump fluor-spar shoot, 18 feet wide, was mined at the John mine; and, considering that the mine and plant had been entirely rebuilt, having burned, the output was unusually large.

No mining was done in Lyon, Caldwell or Trigg counties, though operations in the last two will resume in the spring. Lead and fluor-spar were discovered for the first time in Christian county, at the McReynolds' prospect, giving renewed impetus, and Eastern capitalists are preparing for considerable work in 1907. Further work was also done at the Freeman prospect.

The party headed by the writer completed geologic mapping and investigations of the lead, zinc and spar deposits of the six counties of the district. The conclusion reached concerning these deposits are, briefly: The fluor-spar supply is practically inexhaustible; zinc ore occurs in more considerable quantity than previously supposed, and the assured solution of the milling problem should greatly increase its production; lead occurs in sufficient quantity with both the fluor-spar and the zinc deposits to make a nice profit above what is secured from either type of deposit alone; large pure calcspar deposits occur which will repay mining; favorable conditions occur in parts of northern Christian, northern Lyon, northern Trigg and eastern Crittenden counties, thus extending the eastern, southeastern and southern limits of the district; chances for economic deposits appear less in the faults near the borders than those near center of field; chances along undeveloped portions of the main faults and their complementary fractures, especially in the limestone but also in the quartzite walls, are good and more cross-cutting is advisable. One of the results of the work was the discovery of a simple method of determining the probable strikes of cross and intersecting complementary fractures, where the strike of one fault is known. Recent development work



showed highly favorable results, many good ore shoots being found on old properties, both along the strike and in depth, along the faults.

Topographic mapping was done by the State Geological Survey and U. S. Geological Survey acting in co-operation in Caldwell and Crittenden counties. A re-survey for a railroad route was made by private parties in the western part of the field.

Milling in Western Kentucky District.—The Kentucky mill continues a large ground fluorspar producer, and the only change made was the installation of an eighty-horse-power Corliss engine to secure more adequate power. The Riley mill was operated but little. The Nancy Hanks became a regular producer and a large tube mill was added to increase grinding capacity; the newly patented Ratcliffe-Cohenour shaking screen is in successful operation here. The old Dad zinc mill cleaned some carbonate.

In Caldwell county, the Union Central Mining Co. erected the Union mill, a mill of the Joplin type, at the Stone mine, for the separation of fluorspar and galena, but it will not be operated till the spring of 1907.

The Eagle Fluorspar Co. continued experimental work on zinc-fluorspar ores at their Evening Star mill throughout the year.

A successful separation of fluorspar and zinc sulphides is at last being accomplished, and by at least two distinct processes. One of these, which is already in operation in the district, is a non-acid flotation process; the other electrical, represented by two distinct types of electrical separators, tests of which are reported as satisfactory. The processes are described on succeeding pages.

Southern Illinois District.—The Rosiclare mine, which is 325 feet deep, has been worked for 900 feet at the 300-foot level, the vein varying from 3 to 28 feet of fluorspar and galena. A secondary, striking W. 17 degrees E., intersecting the main vein not far from the shaft, was also worked. The Fairview Incline more than 330 feet deep, was worked at four levels and for about 625 feet, has been completely

stoped out to the 300-foot level; in the latter, the vein was from 6 to 14 feet wide.

On Lead Hill, three mines, the Evansville, Robinson, and Cave-in-Rock, worked two veins, bedded by replacement, 1 foot to 12 feet thick, fluorspar, galena and zinc carbonate. Both beds were worked by entries at the Robinson; while at the Evansville, where they were 150 feet in the hill, only the lower one was mined. At the Cave-in-Rock, at 18 feet depth, they have gone across the lower bed for 240 feet, at which distance it was cut off by a fault; some work was also done on the upper one. The same methods pursued in re-locating faulted coal beds will be of service where these beds are cut off.

An overthrust fault, pitching 35 degrees, having from 3 to 8 feet fluorspar, galena and quartzite, was stoped, and further efforts to intersect the master fault, at the Mary Mine. At the Rose, green fluorspar was mined, machinery installed, and a shaft sunk 115 feet, encountering quartzite and fluorspar. The Pell was re-opened, but not worked to any extent. A power plant was installed at the Hamp Fluorspar mine, and here, as at the Mount Carmel Lead mine, development work was in progress. At the Hubbard mine a broken-down bedded vein of crystallized fluorspar, covering a large tract at grass roots, was operated. The Empire vein, with gravel fluorspar and limestone, and zinc carbonate with a small per cent. of fluorspar, in rather distinct bands, was mined in a pit 50 feet in diameter, and 45 feet in depth. The main Empire shaft is reported to have four feet of solid white, highest grade fluorspar, with limestone walls.

Milling in Illinois.—Four new mills, the Evansville, Mary, Robinson, and Pierce were put in operation; all for the separation of fluorspar and galena from gangue, except the last, which will grind in a Williams pulverizer dry crystallized fluorspar cleaned of red silicious clay by jigging. At the Mary mill, fluorspar and galena have been successfully and profitably separated for the first time from quartzite, in a mill somewhat of the Joplin type, using a Wilfley table for fines. The Robinson and Cave-in-Rock mills have complete sizing systems, and these with the Evansville, which is small,

are equipped with New Century jigs, etc., and Ford tables, and are making marketable products.

The Fairview mill has been materially improved by the rearrangement of the picking belt, so that four now do the work that required twelve or more previously. The cylindrical washer has been cut out, and the shaking washing screen is now used alone.

At the Rosiclare an addition is being built to house Overstrom tables and a Hancock jig the first of its type to be used in the district. The Hancock jigs is to replace Harz jigs, in order that the daily capacity may be largely increased. The Pell mill was in-operative. The Empire plant, which is equipped for washing and crushing fluorspar, and cleaning zinc carbonate, was in operation most of the year. Girls are employed for culling, and show great efficiency.

Central Kentucky District.—The Monitor Mineral Company was able to do but little at their fluorspar properties, the Twin Chimneys and the Fantail mines, owing to excessive water and lack of competent labor. These difficulties are to be overcome, and work resumed. The Twin Chimneys has reached a depth of 117 feet below the tunnel. At the Million calc mine, a tunnel is now being driven, and at 80 feet shows 5 feet of calcpar.

Colorado Districts.—No shipments were reported for 1906 from the Boulder district; one of the operators declared his deposit, from which shipments were made in 1905 was exhausted.

One hundred and twenty-five miles to the southward in Custer county, likewise in a region of Algonkian rocks and recent igneous intrusives, fluorite occurs locally in quantity in veins of composite fault-fissure-breccia-replacement type; occurring in other parts, or in other veins, of the regions more rarely and associated with gold tellurides. Near Silver Cliff, a fissure showing an average of 4 feet of solid fluorspar is being developed by R. W. Blackett, by means of a tunnel. Vein continuity has proven for 500 feet, and some shipments were made in 1906.

Central Tennessee District.—The Rome Incline at 120 feet presents beautiful white crystallized fluorspar. At the Alcorn open-cut, on line of Southern Railway, the fluorspar increases in quantity amongst the limestone crevices, and shaft sinking is contemplated.* Here, amber-colored crystallized fluorspar is gotten. No lead or zinc secured at either property.

A $2\frac{1}{2}$ foot vein of zinc and barite is being prospected in Smith county, by W. E. Minner. At the National Cemetery, near Nashville, Mr. J. E. Wright reports he opened a 1 to $2\frac{1}{2}$ foot vein of fluorspar and barite.

SPECIAL SEPARATION PROCESSES

As stated on the preceeding page successful separation of Western Kentucky fluorspar and zinc sulphides has been accomplished both by non-acid flotation process and by electrical machines.

The Sanders Flotation Process.—Flotation processes for the concentration of sulphide ores depend in general on the floating of the pulverized particles by means of gases in a solution. The Australian processes all make use of acid solutions. Satisfactory results are reported from their application to Broken Hill. New South Wales, ores which contain more or less fluorspar. In the United States, Mr. W. Murray Sanders has recently patented a non-acid flotation process, which is now owned by the Sanders Ore Separating Company. This process is capable of effecting separations not attainable by any of the acid solution processes, as for example the separation of resin blende, and of solving also the more difficult problem of separating fluorspar from zinc sulphide. The great difference between this and other flotation processes lies in the basicity of solution and its selective power for zinc sulphide.

*Private communication, D. C. Roberts.

In this process, neutral or somewhat basic solutions of the earth metals as aluminum sulphate, etc., may be employed. By treating low grade bauxite with sulphuric acid, a solution consisting of aluminum and ferric sulphates is obtained. The solution should preferably be heated and have a specific gravity of 1.15 to 1.25. Sulphide ores treated in such a solution generate hydrogen sulphide, which serves to sustain and transport the particles of ore. Some of the advantages claimed for the process in the patent specifications (U. S. Patent No. 805,382) are: (1) The liquid remains remarkably clear and by virtue of the viscosity of the solution and its high surface tension, the particles are sustained for a very considerable period, and (2) non-corrosive character of liquid; both of these features admitting of considerable latitude in the choice of materials for, and construction of, separators. (3) Permits of fine pulverization of zinc sulphide (very necessary in Kentucky-Illinois zinc-fluorspar ores) without serious losses in roasting, the decomposition of the earth metal oxide acting as a binder for the fine ores, reducing dust losses to minimum. (4) Non-corrosive action of such binder toward zinc retorts being often beneficial, as opposed to the corrosive action of products of some of the acid solution processes.

The following description of the Sanders mill operated by the owners of the process, together with further details of the process itself, is based upon data kindly supplied by Mr. W. Murray Sanders.

The mill is located about three-eighths mile south of the depot at Marion, Ky., just east of the Illinois Central railroad. It is capable of handling problems involving the separation of lead, zinc and fluorspar.

The ore is received from the railroad switch and dumped upon an elevated platform from whence it is fed to the mill. It is passed through crusher, rolls and screens. All passing 20 mesh is fed to three Theurer tables, tables somewhat of the Wilfley type. These tables make three products, (1) galena, (2) zinc middlings, and (3) low grade fluorspar. (1) goes to lead concentrate bins, (2) is fed to Sanders flotation separator and (3) is sent to waste dump.

The Sanders separator consists of a lead lined wooden tank, 5 feet in diameter and 20 inches deep. Its capacity varies, with different ores, from 15 to 20 tons per day (single 10-hour shift). The flotation solution is prepared in a lead lined wooden tank, also. Low grade bauxite may be used, though the grade is immaterial. Sufficient sulphuric acid is added to obtain a solution of aluminum and ferric sulphates, having a specific gravity, according to the needs of the ore, varying from 1.15 to 1.25, the solution being heated 85 to 90 degrees Centigrade. Zinc sulphide treated in such a solution generates hydrogen sulphide gas, which serves to sustain and transport the particles of ore; neither the solution nor liberated gas appears to effect chemically the sulphides treated; that is, they show no apparent alteration. The lead particles, such as remain in the middlings from the tables, if any, are not floated by the solution, the zinc sulphide particles alone being floated. Such zinc particles flow off out of the solution and are allowed to settle in another tank, from which they are drawn off and sent to the concentrate bins. The fluorspar separated usually contains too much silica to be valuable.

The percentage of recovery of total zinc sulphide in an ore depends upon the degree of dissemination and the consequent table recovery. The flotation recovery will run, according to Mr. Sanders, 80 to 95 per cent. The process has not been tried on middlings crushed finer than 60 mesh. The most suitable sized particles for treatment are said to be from 20 to 40 mesh.

The capacity of the plant is reported as 15 tons per day, (single shift). Eight men are employed and power is supplied by a 50-horse power common slide-valve engine and a boiler of like size. Water is secured from an artificial pond at the mill.

The cost of milling is said to vary with the character of ore treated; a 50-ton plant should operate not over 75 cents per ton, total cost. For ore from the Nine Acres mine it is figured at 74 cents, 40 cents of which is allotted for preliminary concentration and 34 cents for subjecting to flotation process.

With the present table equipment Mr. Sanders reports

about 60 per cent. of the original zinc contents as minimum recovery on the most difficult ores, and the probable average recovery for all ores he places at from 75 to 80 per cent.

In the prospectus of the Nine Acre Mining Co., the following results are reported on a test run of residue ore from the Nine Acres mine after the choice ore had been picked out and shipped. This is a typical mixed ore consisting of limestone silica in form of jasperoid, fluorspar, galena and zinc blende, perhaps also some calcite:

Test run on Nine Acres ore, November 24, 1906:

Amount charged, 20,000 lbs. Assay: Zinc 14.9 per cent., lead 3.3 per cent.

Recovery from tables 5,450 lbs., containing 44.4 per cent.

Final recovery, zinc concentrates, 2,900 lbs., containing zinc 58.4 per cent.

Lead concentrates, 690 lbs.

Repairing solution for flotation 65 lbs. acid.

The addition of a slime plant would materially increase the returns recorded above, as owing to the nature of the ore, a portion of it is unavoidably reduced to a condition of slime, which shows upon assay a similar composition to the original ore.

Signed: Sanders Ore Separating Co.

Examining critically the figures reported, we find the tables recovered $83\frac{1}{2}$ per cent. of the lead contents of the original charge. They show, also, a recovery of 81 per cent. of the zinc contents of the original charge; from the middlings subjected to flotation 70 per cent. was recovered, representing a total recovery of 57 per cent. of the zinc in the original ore. The percentages of loss in tailings and from sliming were not separately determined. The concentrates run 58.4 per cent. zinc and, according to Mr. Sanders, contained less than 1 per cent. of fluorspar.

The percentage of recovery from the tables while very good, might be increased and this together with savings from slimed material should assist to materially increase the percentage of recovery. The character of the concentrates if as reported, is satisfactory. The figures, to say the least, are highly encouraging and speak well for a probability of accomplishing the results hoped for by Mr. Sanders, that is, an average recovery of 75 to 80 per cent. for all ores, if proper care be taken in treatment. Especially are they favorable when it is considered they result from a double process, the treatment by tables and the re-treatment by flotation.

Even if the recovery should not prove better than in the case of the Nine Acres ore, it would still be good enough to encourage Western Kentucky operators to exploit thoroughly their fluorspar-zinc ores, where the percentages are sufficiently high for zinc and lead alone; elsewhere in connection with the purer fluorspar veins, the zinc recovered would add nicely to the profits.

It is proposed to install a 50-ton plant as a result of the test of the Nine Acres ore, at the Nine Acres mine, which mine is to be re-opened by the Nine Acres Mining Co., as soon as arrangements can be completed.

Another difference is to be noted between the acid and basic flotation processes. In the former, the product is subjected to flotation first and to mechanical separation later, while in the basic process the treatment is in reverse order. According to figures submitted by Queneau to the Zinc Corporation* upon Australian ores, which differ most from the Kentucky ores in having iron sulphide in the zinc blende, the percentage of zinc recovery, assaying 44 per cent., was 81 per cent. from the Potter flotation bath while that from the Sanders tables it may be seen ran practically the same. After treating by mechanical separation, the Australian flotation product yielded 71 per cent. of the zinc in the original product treated, these final concentrates assaying 50 per cent. zinc. The basic process makes a much higher grade concentrate (58 per cent), though the recovery is somewhat less as would be expected; this compares favorably with the acid process, and gives promise of excelling it.

The electrical machines for which successful treatment of the zinc-fluorspar ores is claimed are the Sutton Steele & Steele Dielectric Separator and the Blake-Morscher Electrostatic Separator.

The Sutton, Steele & Steele Dielectric Separator.—Messrs. Sutton, Steele & Steele have kindly supplied the following description, with accompanying diagrammatic sketch, of their apparatus, and of its method of separating pyrite, resin blende and fluorspar:

*Engineering and Mining Journal, Vol. LXXXII, 1906, page 826.

“The Sutton, Steele & Steele Dielectric Separator depends for its operation upon the difference in the dielectric capacity, or, in other words, the specific induction capacity of the particles under treatment, and not upon the difference in the conductivity of same.

“The principle can be readily understood if it will be borne in mind that dielectrics differ greatly in their ability to transmit electro-static lines of force, or, in other words, to allow induction to take place through their mass. In the present commercial application of static electricity to ore dressing other manufacturers separate the different particles of an ore pulp by the difference in their conductivity; the pulverulent mass being usually fed to a metal plate or cylinder which is charged with static electricity, the material of good conducting particles of the same being repelled *further* than the non-conductors.

“In the Sutton, Steele & Steele separator *none* of the particles are repelled. One class of particles adhere tightly to the cylinder or electrode, while the others drop *inertly* from it, while a rotating brush removes the adhering particles.

“In operation the material is fed to a rotating cylinder electrode which is connected to the earth and to which there is delivered from an adjacent electrode a convective or silent discharge through which the particles to be separated are carried while resting on the grounded electrode. The resulting conditions are such that the dielectrics are polarized, some more strongly than others. The electrical condition of these particles are in the same state as the glass dielectric separating the two metal coatings of a Leyden jar, which after discharge still shows a residual charge. The particles while resting on the grounded electrode receive a discharge of static electricity from the adjacent electrode and they thus have their opposite faces exposed to opposite electrical influences, and consequently each particle is divided in its charge having both + and — polarity. This is maintained and is the cause of their adhering to the electrode in a similar manner as iron filings do to the magnet.

“It has been discovered, however, that there is a difference in the time that dielectrics can be polarized, and in order to make separations between different dielectric particles it

has been found expedient to deliver to the charging electrode a series of electrical impulses predetermined as to duration and time. The effect of this can be understood if we will take for example, two dielectric substances such as zinc blende and the resin variety and fluorspar. Fluorspar polarizes more readily than zinc-blende, therefore if the electrical discharges are regulated as to the duration of time, the fluorspar can be polarized without affecting the zinc-blende and one can thus be separated from the other. It must not be inferred, however, that the Sutton, Steele & Steele separator does not separate conductors from non-conductors. It does so by polarizing the dielectrics while the conducting particles remain inert, being neither repelled nor attracted, and fall off the electrode unaffected by the current.

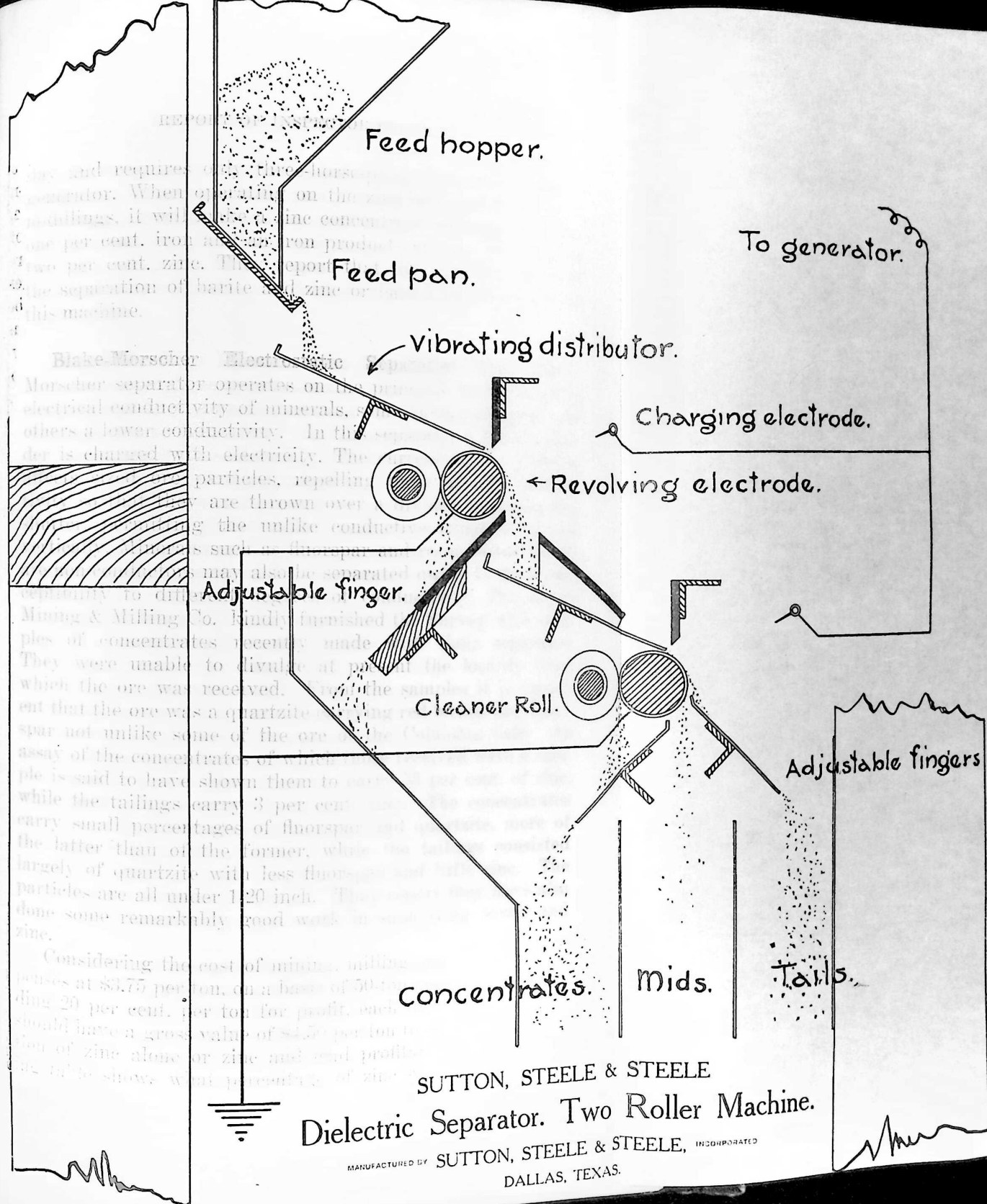
"The difference in the separation of the zinc-blende from mundic iron and zinc-blende from fluorspar is as follows: In the case of zinc and iron a continuous convective discharge is maintained passing through the ore pulp and delivered to the cylindrical electrode. The effect is to polarize the zinc while the iron is not affected and drops inertly into a suitable receptacle. The zinc adheres to the cylindrical electrode (which is rotated during operation) and is brushed off into a separate receptacle.

"In the case of fluorspar and zinc it has been observed that the former will commence to adhere to the electrode sooner than the blende, and it therefore follows that if the electro-static charges are delivered in impulses, the duration of time of each impulse being of just sufficient length to affect the fluorspar without affecting the zinc, one can readily be separated from the other.

"For a scientific explanation of the phenomena we refer to our process patent No. 813,063."

Since electrical separators of other kinds have the particles under influence only a fraction of a second, and the time interval does not enter into the Sutton-Steele separator, the particles remaining until brushed off, it should make the best separation.

Sutton, Steele & Steele have given the Survey the following additional data concerning their machine: It operates on raw material without roasting, has a capacity of ten tons per



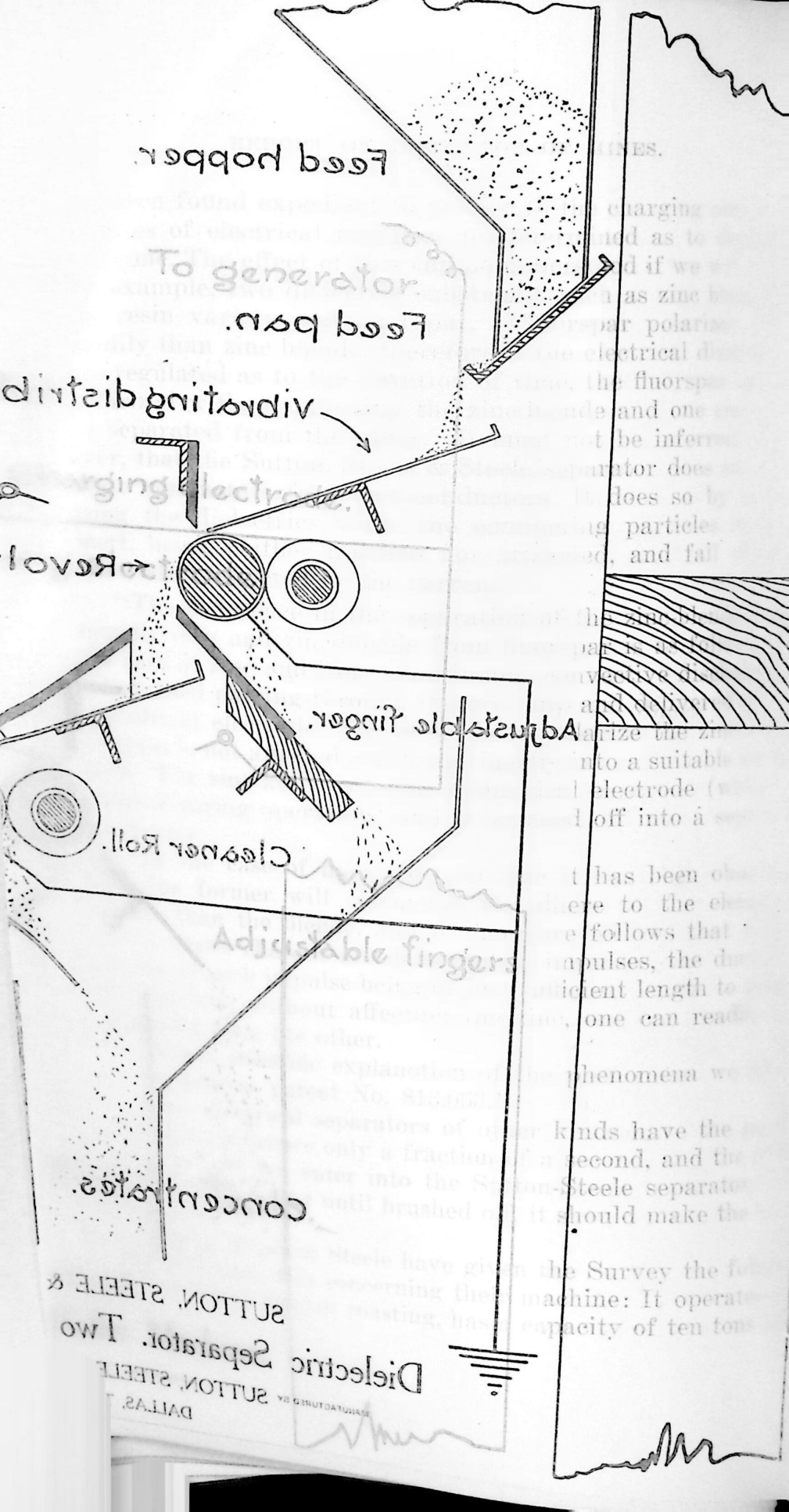
REPORT
and requires
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one per cent. iron
two per cent. zinc.
the separation of barite and zinc
this machine.

Blake-Morscher Electric Separator
Morscher separator operates on the principle of the electrical conductivity of minerals. Minerals of high conductivity, such as iron, are attracted to the charged electrode, while minerals of low conductivity, such as barite, are repelled and fall into the tailings. The separator is charged with electricity. The revolving electrodes repel the low conductivity particles, throwing them over the adjustable fingers. The unlike conductivity of minerals such as iron and barite may also be separated. The separator is capable of dividing concentrates from tailings. Mining & Milling Co. kindly furnished samples of concentrates recently made. They were unable to divulge at present the source from which the ore was received. The separator is an element that the ore was a quartzite. The separator is a spar not unlike some of the ore. The separator is an assay of the concentrate. The separator is a sample is said to have shown them to contain 10 per cent. while the tailings carry 3 per cent. The separator carry small percentages of fluorapatite and quartzite, the latter than of the former, while the tailings are largely of quartzite with less fluorapatite and quartzite. The particles are all under 1/20 inch. The separator has done some remarkably good work in separating iron and zinc.

Considering the cost of mining, milling and shipping at \$3.75 per ton, on a basis of 50 per cent. profit, each ton of concentrate should have a gross value of \$4.50 per ton. The separator of zinc alone or zinc and lead profits. The separator to show what percentage of zinc is in the concentrate.

Concentrates.
Mids.
Tails.

SUTTON, STEELE & STEELE
Dielectric Separator. Two Roller Machine.
MANUFACTURED BY **SUTTON, STEELE & STEELE, INCORPORATED**
DALLAS, TEXAS.



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Steele separator

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day and requires only three-horse-power for separator and generator. When operating on the zinc-iron concentrates, or middlings, it will make a zinc concentrate carrying less than one per cent. iron and an iron product carrying from one to two per cent. zinc. They report that they have never tried the separation of barite and zinc or barite and fluorite with this machine.

Blake-Morscher Electrostatic Separator.—The Blake-Morscher separator operates on the principle of the relative electrical conductivity of minerals, some having a higher and others a lower conductivity. In this separator a metal cylinder is charged with electricity. The current of the cylinder affects sized ore particles, repelling those of like conductivity so that they are thrown over a divider or separating shutter, permitting the unlike conductive minerals to fall vertically. Minerals such as fluorspar and resin blende which are non-conductors may also be separated owing to their susceptibility to different degrees of conductivity. The Blake Mining & Milling Co. kindly furnished the Survey with samples of concentrates recently made with their separator. They were unable to divulge at present the locality from which the ore was received. From the samples it is apparent that the ore was a quartzite carrying red blende and fluorspar not unlike some of the ore of the Columbia lode. An assay of the concentrates of which those received were a sample is said to have shown them to carry 55 per cent. of zinc, while the tailings carry 3 per cent. zinc. The concentrates carry small percentages of fluorspar and quartzite, more of the latter than of the former, while the tailings consisted largely of quartzite with less fluorspar and little zinc. The particles are all under 1-20 inch. They report they have also done some remarkably good work in separating barite and zinc.

Considering the cost of mining, milling and incidental expenses at \$3.75 per ton, on a basis of 50-ton operation, and adding 20 per cent. per ton for profit, each ton of ore handled should have a gross value of \$4.50 per ton to make the extraction of zinc alone or zinc and lead profitable. The following table shows what percentage of zinc would be required

in an original ore to yield a gross value of \$4.50 per ton, were the percentage of zinc recovery either 60, 70, 75 or 80 per cent. of that in the original ore, if the ore contained zinc only, or if it contained 1.25, 2.50, 3.75 or 8.25 per cent. of lead also, counting the lead yield upon concentrating at 80 per cent. or 1, 2, 3, or 5 per cent. respectively and the average value of lead at \$60 per ton, were the zinc to bring \$30, \$35, \$40, \$45, \$50, \$55 or 60 per ton. Since the average value of zinc ore in 1905 was \$44.88 and in 1906 \$43.24 per ton, the percentages for these years lay between those for \$40 and \$45, and from this it may be judged about what is to be expected in 1907. Since the value of lead ore in the same years averaged \$62.12 and \$77.40, the average value of \$60 used for lead is believed conservative. Any value derived from associated fluorspar may simply be added to the profits; or it might be made to take the place of a part of the zinc and thus reduce the amount of zinc required.

TABLE VIII.

REQUIRED ZINC CONTENT IN ORE WITH A KNOWN PERCENT-
AGE OF RECOVERY FOR ORE TO BE VALUABLE.

Value of Zinc Ore								
f. o. b. cars		\$30.00	\$35.00	\$40.00	\$45.00	\$50.00	\$55.00	\$60.00
Per cent. of								
Recovery.	Percentage of zinc required in ore containing zinc only.							
60.00	25.00	21.43	18.75	16.66	15.00	13.60		12.50
70.00	21.43	18.37	16.07	14.28	12.86	11.68		10.72
75.00	20.00	17.15	15.00	13.33	12.00	10.91		10.00
80.00	18.75	16.07	14.06	12.50	11.24	10.23		9.38
Recovery.	Percentage of zinc required in ore from which 1 per cent. lead is recovered.							
60.00	23.66	18.56	16.25	14.43	13.00	11.80		10.83
70.00	18.55	15.91	13.92	12.37	11.14	10.11		9.28
75.00	17.33	14.85	13.00	11.54	10.40	9.44		8.66
80.00	16.25	13.92	12.18	10.82	9.75	8.85		7.12
Recovery.	Percentage of zinc required in ore from which 2 per cent. lead is recovered.							
60.00	18.33	15.71	13.75	12.21	11.00	10.00		9.17
70.00	15.55	13.47	11.78	10.47	9.43	8.57		7.86
75.00	14.66	12.57	11.00	9.77	8.80	8.00		7.33
80.00	13.75	11.78	10.31	9.16	8.25	7.50		6.88
Recovery.	Percentage of zinc required in ore from which 3 per cent. lead is recovered.							
60.00	15.00	12.85	11.25	10.00	9.00	8.31		7.50
70.00	12.85	11.01	9.64	8.57	7.71	7.12		6.42
75.00	12.00	10.28	9.00	8.00	7.20	6.65		6.00
80.00	11.25	9.63	8.43	7.50	6.75	6.23		5.62
Recovery.	Percentage of zinc required in ore from which 5 per cent. lead is recovered.							
60.00	8.33	7.13	6.25	5.55	5.00	4.58		4.16
70.00	7.14	6.12	5.35	4.75	4.28	3.88		3.57
75.00	6.66	5.57	5.00	4.44	4.00	3.62		3.33
80.00	6.25	5.35	4.68	4.16	3.75	3.40		3.12

CHAPTER VI.

ACCIDENTS FOR 1905.

For the calendar year 1905 a total of 140 noteworthy accidents were reported, of which 31 were fatal, 28 of the fatalities having occurred underground. Of the 109 non-fatal casualties, 70 were serious, and 65 of them occurred underground.

A summary of the fatal accidents has already been given. Following is a descriptive list of them:

DESCRIPTIVE LIST OF FATALITIES, 1905.

Bell County.—Black Raven Coal Co. : Gus Voloco, (34 years) was killed on May 18th by premature explosion of dynamite. With Steve Zampotis, he was tamping a hole in it slate. Left wife and children, who were still in his native land, Greece.

Excelsior Coal Co.: Dee Helton, miner, was fatally injured January 17th, by a wreck on the Incline, (surface plane). Lived about 24 hours after injury. Trip was ascending and he was riding on it.

Straight Creek Coal & Coke Co.: Millard Huddleston, miner, was killed by fall of slate, September 15h. Left a motherless child.

Same company: Oscar Trosper, while riding on end of a gondola, on September 16th, was mashed against end of another gondola. Died in a hospital within a few days.

Wallsend Coal & Coke Co.: Harvey McDonald was struck by train of empty cars, in Main entry of No. 3 mine February 20th. Leg was broken. Died within a few days.

Winona Coal Co.: Wm. Hoskins and Sam Leman were fatally burned by explosion of a keg of powder, December 16. Both left wives and children. No details given as to cause of explosion. Presumably occurred in the mine.

Christian County.—Empire Coal & Mining Co. : Charles Glass, (colored) was killed by fall of slate, December 14th. While pushing loaded car out of a room, slate fell out of a slip, crushing his head. Room was in 28 feet, driven 22 feet wide and said to be propped within 13 feet of face.

Hopkins County.—Nortonville Coal Co. : George Dulin, (colored) was killed in No. 2 mine by fall of gob in a room, January 30th.

Same Company: Floyd Deberry driver at shaft mine, was killed by fall of gob, June 2d. Neck broken. Coroner's verdict was: "From the evidence given before us the roof was considered to be in a safe condition and the accident was unavoidable and one which no one was responsible for." (The Inspector regrets that the evidence given before the coroner's jury was not submitted with the report.)

Victoria Coal Co.: Alex. Nisbet, 35 years, shooter; Ike Gibson, 30 years, shooter's helper; Richard Bates, 35 years, shooter's helper; killed by powder explosion in powder room, which occurred January 24th. Bates let his lamp fall into or on a keg of powder; 2 full kegs exploded. Nisbet lived two days and Bates lived four days. Gibson was dead when found about two hours after the explosion. All men were colored. Nisbet left wife and two children.

Knox County.—North Jellico Coal Co. : H. L. Smith, machine runner. Two spinal vertebræ fractured and spinal cord lacerated, causing paralysis of lower limbs and abdominal viscera, January 11th, by fall of slate while cutting coal in a room neck. Died in a Louisville hospital July 26th. Left wife and one child.

East Jellico Coal Co.: James Meeks, miner, 35 years old. Killed on railroad track, May 22d. Wife and three children.

Same company: Blake Logan, miner, 19 years old. Fatally injured by falling of slate in December.

Artemus Jellico Coal Co.: L. D. Handrickson, miner, 40 years old. Spine dislocated by fall of slate, August 25th. Died November 28th in a Louisville hospital.

Laurel County.—Pitman Coal Co. : Sanford Dyer, 35 years old. Injured by fall of slate in a room, May 26th. Died May 30th. Wife and four children.

Standard Coal Co.: Preston Cornelius, miner, 22 years old. Killed by fall of slate in room neck. Failure to properly timber.

Lee County.—South Fork Coal Co. : John Deaton, about 25 years old. Killed by fall of slate in room, Nov. 8th. Wife and two children.

Same company: Frank Minton; about 28 years old. Fatally injured by fall of slate in room, November 8th. Wife and one child.

Morgan County.—Eureka Cannel Coal Co. Wheeler Hammond, miner, 23 years old. Fatally injured by fall of loose coal and draw slate, September 8th. Left one small child.

Watson Cannel Coal Co.: Gerial Cole, miner, 19 or 20 years old. Killed by fall of slate and coal August 15th; was working with Pickle Simer. After supper the two returned to mine to have some loose coal for following day. After firing two shots, they returned to the room as soon as the smoke would permit. The shots had pulled out a space 7 feet long by $2\frac{1}{2}$ feet wide, leaving some coal at the point of the holes. The top came easily and had begun to swag and Cole put a thread bar over it and tried to pull it down, but failed. Taking his pick he began to cut the coal, when the jar caused the loose coal and slate to fall on him, breaking his neck. "The amount of coal and slate would not have hurt him if it had not been the—position he was in when he fell.

White Oak Cannel Coal Co.: Cleveland Gibbs, miner, 21 years old. Killed by fall of slate, December 28th.

Muhlenberg County.—W. A. Wickliffe Coal Co. : S. O. Tanner, miner, 35 years old. Killed by fall of gob, August 10th. Was shearing coal while turning air course. Wife and six children.

Rockcastle County.—New Livingston Coal Co. : Ed. Elkins, about 26 years old. Killed by fall of slate, August 30th.

Same company: John May, killed by premature blast, about November 26th. Wife and several married children.

Union County.—Marion Coal Co. : George Smith, about 50 years old, killed by fall of slate from a slip or fault, August 31st. The slate was 8 feet long by 2 feet wide by 2 feet thick; it fell without warning. Wife and one child.

Webster County.—Providence Coal Co., No. 2 Mine: Ses Lynch, colored, driver, about 19 years old. Was driving 2-mule team pulling 8 loaded cars. Attempted to board the moving trip but missed footing; fell and portion of trip passed over him. Died from injuries April 14th.

Whitley County.—Burk Hollow Coal Co.: Morrison Williams, 28 years old. Killed by fall of slate while mining coal.

Main Jellico Mt. Coal Co.: D. J. Foster, colored, miner, 38 years old. Killed by fall of slate August 30th. Following is report sent to this office on day of accident:

"We regret to report a fatal accident which occurred in our Kensee Mine at 3:30 today. Joe Foster, colored, age 38, married, no family. The deceased was engaged in mining at the head of the Collins entry and was 9 feet under the slate when same broke almost across the entry, killing him instantly. The place was examined immediately after the accident by the mine foreman and the bank committee and they found that no timbers had been put up, to which they hereby certify by attesting their signatures.—Yours truly, Main Jellico Mountain Coal Co., Hywell Davies, Vice President; M. John Haney, Ross Davis, A. J. Higginbotham. Attest: W. V. Mullen."

NON-FATAL ACCIDENTS FOR 1905.

It may be well to explain that in these statistics a "serious accident is one in which a bone or bones may be broken, amputation rendered necessary, or life otherwise endangered, or long confinement to bed rendered necessary. Other accidents are regarded as "minor" or "slight." It will be well to remember that an accident may be "painful" or "severe," but not at all "dangerous." Many almost trivial accidents are reported by mining companies—such as a "bruised thumb" or "scratched face"—which do not at all interfere with a man's work; such accidents are eliminated when the list is made up for this report.

Omitting the slighter injuries, 109 noteworthy non-fatal accidents were reported for the calendar year 1905, of which 102 occurred underground. Following is a summary of the accidents:

CAUSES.	Serious		Not Serious		Total
	In	Out	In	Out	
Fall of slate	19		10		29
Fall of coal	5		3		8
Cars	8		7		15
Motor			1		1
Mining machine	1				1
Returned on shot	1				1
Flying coal from shot	3				3
Blown-through shots			2		2
Windy shot explosion	2		1	1	4
Blown-out shot	2				2
Powder explosion	2				2
Burned by gas	1		3		4
Drilling out shot	3		2		5
Handling shot			1		1
Caging	1				1
Kicked by mule	3		1		4
Fell from tippie		2			2
Miscellaneous	14	3	6	1	24
Total	65	5	37	2	109

Bell County.—Bell Jellico Coal Co. : Clay Johnson, 18 years old. Skull fractured by flying coal from a blast. Confined to bed about 10 days. August 7th.

Black Bear Mines, Edward Blake Lessee: Taylor G. Bingham, while cleaning away snow at tippie was struck on the forehead by some coal flying from a car which had broken loose on the incline; was knocked into a pile of iron; gash cut in his leg below knee and wrist strained, February 13th.

Excelsior Coal Co.: Following were injured on January 18th in the wreck on incline in which Dee Helton lost his life (see fatal accidents). Andrew Hill, face scraped, left arm bruised, small finger of left hand dislocated; Fred Hunzinker, middle finger of left hand dislocated, left arm and left ankle

sprained; Will Nance, Joe Nance, Sam Nance, Jess Wilson, Z. Lane, Bob Lane, Willie Lane, Tobe Wilson, Lee Smith, various minor injuries more or less painful.

Same company: Lee Cooper, skull "crushed" while working on incline. (Cause not given). Off work "a few weeks." Occurred in July.

Same company: Jno. Rodgers, leg broken and left shoulder dislocated by fall of slate. August 28th.

Fern Lake Coal Co.: Robert Parks, disabled about 30 days by fall of slate; bruised about body. October 13th.

Same company: Con Branscomb, back sprained by fall of slate, October 30th, and disabled about 14 days.

Imperial Jellico Coal Co.: John Logan, arm broken and two cuts in head, by fall of slate, December 20th.

Queensbury Coal Co.: Will Cozart, driver. Kicked by mule; serious wound in eye. In May.

Winona Coal Co.: Robert Earl and Ben Sharp were severely burned in the powder explosion which killed W. Hoskins and S. Leman. (See fatal accidents). December 16th.

Boyd County.—No. 8 Mine, John Wurts, Lessee: Wm. Mutters, caught between bank car and side of entry. Lost 6 days. Sept. 13th.

Same mine: Geo. Gearhart, four ribs broken by fall of slate at face of room, November 30th. Coal had just been removed; slate probably jarred loose by blast.

Breathitt County.—Kentucky Union Co.: James McAllister, back severely injured by fall of slate. Off about two months.

Carter County.—Adkins Coal Co.: Brack Reeves and Grant Saxton powder burned by blown-through shots. Had drilled their holes too close to each other and had used too much powder. Injuries not serious. November 14th.

Hancock County.—Fenley Coal Co.: William C. Board, injured by some cause January 17th. Company's very unsatisfactory report simply states: "Negligence; crushed finger; loss two weeks work."

Same company: Jesse Kincade; "mined under too far, let coal down on him; slight crush of left side and left hip." February 8th.

Same company: Jesse L. Rice; "neglecting to pull down top before mining a shot off as he was warned to do; sprained back with the possibility of an injured spine." February 24th.

Same company: Tom Egan, struck by "falling stone" and leg bone fractured. September 6th.

Henderson County.—Rash, Denton & Co.: E. S. Blanks, Superintendent of mine. Fell off cage as it started from bottom of shaft. Head and shoulders hurt. Confined to bed a few days. Date not given.

Hopkins County.—Carbondale Coal & Coke Co.: Allen Davis, injured on head and back by slate fall, September 8th.

Brasher Coal Co. (Royal Mine): Dan Porter, colored loader. Hips injured by fall of coal. Part of a hung shot did not fall when blasting was done. While Porter and others were loading coal in the room, the hanging piece fell and caught Porter. No bones broken. September 23d.

Daniel Boone Coal Co.: Geo. W. Cook, badly bruised by fall of gob. May 13th.

Nortonville Coal Co., No. 2 mine: M. V. Ferguson, driver; while riding on front of rear car of a trip of two cars. front wheels of front car broke down and Ferguson's ankle was injured by being jammed between the cars. In October.

Same company: No. 1 mine: R. H. Lovan, got ankle sprained while going down in cage. Engineer partially lost control of engine and let cage hit bottom too hard. December 18th.

Reinecke Coal Mining Co.: James Turner, loader. Set fire to some gas and was burned about face and hands. January 3d.

Same company: William Cox, driver. Caught between car and rib and thighs injured. January 14th.

Same company: Horner McBrayer, driver. Kicked by mule. Two ribs broken. February 24th.

Rose Creek Coal Co.: Riley Hibbs, loader and driller. Fell into sump; three ribs broken. January 11th.

Same company: A "powder explosion," resulting from "drilling out a shot," injured the following: Leonard Day, (driller), hands, face and head burned, and lost one eye; Will McLeod, (driver), hands and face burned, and gash over eye; W. G. Barrett, (foreman), face and hands badly burned, one

eye gone; John Dooley, (helper), face and hands burned. April 17th.

Same company: Marshall Early, driver, knee sprained by being caught between car and prop. August 31st.

Same company: Jno. King, loader; left hip dislocated by fall of roof. In November.

St. Bernard Mining Co., Arnold mine: Geo. Porter, hostler, cut on knee by piece of coal falling from face; lost 28 days. August 4th.

Same company and mine: Willis Phillips, machine man; ankle badly bruised by lump of coal falling from face. December 6th.

Same company, Barnsley mine: Bishop Smith, machine runner; collar bone and one radius (near wrist) broken by fall of slate. November 15th.

Same company, Earlington No. 11 mine: Gus Morgan, cutter; machine kicked and arm was jammed between machine and prop; lost 8 days. August 31st.

Victoria Coal Co.: John Parks, hostler; back, head and shoulders injured by piece of coal from the face, while he was shooting slack. Off about three weeks. In July.

Knox County.—East Jellico Coal Co.: Charles White, miner; struck by haulage rope and ankle broken. December 6th.

Same company: John Trosper, driver; stood on car bumper and struck head against cross timber, injuring back. In December.

North Jellico Coal Co., Bertha mine: George Childers and Edgar Frost, machine runner and helper, injured by slate fall. Childers had two spinal vertebræ and two ribs broken. One of Frost's vertebræ broken. Both paralyzed from injuries downward. February 20th.

Same company and same mine: James Hill, loader; injured about head and neck by slate fall in entry. Not serious. March 6th.

Same company and same mine: G. M. Hale, machine runner; injured around hips by slate fall. Not serious. June 6th.

Same company and same mine: Henry Smith, night slate handler, while riding on one of the trips was injured by trip

being wrecked; head was knocked against a post. Not dangerous. December 19th.

Same company and same mine: H. C. Johnson, loader: back and hips severely strained by fall of slate, but not serious. November 25th.

Same company, Wilton mine: Charles Young, loader: right side of skull and bones in left side of face broken by slate fall. Left side of face paralyzed. February 1st.

Same company, same mine: John Profit, trip rider; left leg caught between mine car bumpers and small bone broken and flesh lacerated. Was coupling a loaded car to rear end of trip, and as there was a down grade was bracing car with his back to prevent too violent a concussion; foot slipped and he fell, with result stated. March 7th.

Same company, same mine: Bud Engle, coupler; was riding rear end of motor while empty trip was backing through a cross-over on main entry. In going through the switch the car next the motor raised up off the track, catching his foot between car and motor, bruising it badly. May 10th.

Same company, same mine: Oscar Barton, tibia of right leg broken by slate fall while cutting coal with machine. July 17th.

Same company, same mine: B. M. Bunch, machine helper; struck on back while in stooping, and doubled up, by fall of slate. Prop had been removed to allow machine to be placed, and runner neglected having it replaced. Severe but not dangerous. On same day, Floyd Castle, while riding on front car of trip had his leg broken by being run into a closed brattice door—the switch having been thrown the wrong way. September 19th.

Laurel County.—G. W. Gurvin's mine: Sam Hicks, miner; leg broken by slate fall. July 31st.

New Altamont mine (J. L. Wells): Charles Cornett had ankle sprained by "black jack" from between coal falling on it. December 20th.

Lee County.—Beattyville Block Coal Co.: W. H. Burns had leg broken while holding back loaded car coming down incline; foot slipped, throwing leg under car. October 31st.

Richardson Coal Co.: Joe Jackson, miner; one bone of leg broken by coal falling on same. October 18th.

McLean County.—Green River Coal Co.: John Hunt driver; kicked by mule, fell from car, left leg broken by car. April 10th.

Memphis Coal Co.: J. W. Hughes, back injured but not seriously, by standing shot. June 15th.

Morgan County.—Eureka Cannel Coal Co.: John Walsh, leg crushed, rendering amputation necessary, by fall of loose slate and coal under which he was working with Wheeler Hammond (who was killed). September 8th.

Muhlenberg County.—Crescent Coal Co.: E. M. Dearmond, loader, was picking down some loose coal in corner of his room, when it fell on him cutting leg badly and dislocating knee joint. May 21st.

Dovey Coal Co.: Rufus Jones, while driving got arm injured by its being caught between two cars. Off two weeks. In December.

W. G. Duncan Coal Co., Luzerne mine: Clarence Howell, driver; back sprained by fall of slate. Lyon Lumster, trapper; leg broken below knee while riding between two cars; cars got off track and caught his leg. December 27th.

R. Morgan Coal Coke & Mining Co.: E. Brodly and R. Mitchell, Jr., drivers "were kicked by mules but not seriously hurt." March 20th.

Same company: Jno. Elshide, driver, was "hurt, July 26th, by running into wreck on Main entry." Bud Ferguson "had foot crushed while cageing." In July.

Same company: W. H. Wilcox, "car trimmer," was injured by a car door dropping on his hand. Outside. Not serious. In November.

Such reports as the foregoing are very unsatisfactory. From them, it can not be determined what was the nature of the injuries received by Brodly, Mitchell, Wilcox and Elshide. Presumably, if Ferguson's foot was actually "crushed," the injury was serious; it may be said, however, that the word "crushed" is often misused—used when "bruised" or "squeezed" is really meant.

Greenville Coal Co., Powderly mine: Long Barton, driver; caught between mule and car; side mashed, hand cut; out only a few days. January 11th.

Same company and mine: Robert Penrod, driver; fell from seat on car; foot and ankle mashed. January 28th.

Same company and mine: Taylor Brown, miner; severely burned about face and upper part of body, and eye probably destroyed, by shot exploding when he was trying to drill out a cartridge which he could not push back in drill hole. February 25th. (Bob Wickliffe, not employed by company but with Brown, was injured at same time, but not so seriously as Brown).

Central Coal & Iron Co., Render mine: Thos. Walker. riding in front car, with foot hanging low, foot caught in switch point between tracks, "jamming his foot." (Impossible to determine from such report the extent of injury.) January 6th.

Same company, same mine: Jno. Engelby, miner, 16 years old. Riding out of mine on car, with head resting on edge and elbow extending up; was caught against roof; bone in arm fractured. August 22d.

McHenry Coal Co.: Perry Render, track-layer was struck by haulage rope and right leg broken. May 11th.

Pulaski County.—Peters & Souleyret, Cogar Creek mine: Mack Hughes, 16 or 17 years old; hurt by fall of loose slate. (Extent of injury not reported). In February.

Eagle Coal Co.: E. B. Lackey, while pulling down coal in his room was struck by piece of coal and arm broken. April 10th.

Indian Head Coal Co.: Charles E. Miller, coal loader; struck by fall of slate, while shoveling coal; severe scalp wounds and skull fractured. Totally recovered in time and returned to work. July 31st.

Rockcastle County.—Big Hill Coal Co.: Sam Rose, weighman. Trip of cars got loose on incline, knocked tippie down and Mr. Rose's leg was broken. January 4th.

Union County.—Bell-Union Coal Co.: Wm. Gepner, miner. "Crushed or mashed" by fall of slate. "Fully recovered within a few days." February 28th.

Same company: Three persons, names not given, burned by gas. "One, a boy, 16 (about) years old; one a man, 45 probably; and the other one probably 40. Boy and one of the men but slightly burned and long since fully recovered. The

other man more seriously burned, but is at this time (February 6th) nearly recovered. Occurred in December.

B. C. Davidson & Sons: Frank Thomas, miner; "face cut and sprained by falling slate." October 23d.

Ohio Valley Coal & Mining Co.: Holbert Griffin, miner. While coming from his working place there was a windy shot on opposite side of entry; just as he was coming through door, the wind drove the door back in his face, knocking him down and bruising him severely. Lost 4½ weeks. In August.

Same company: Warren Stull, driver, driving two mules; lost an empty car while going in and ran into it while coming out with loaded trip. Arm sprained and general bruises. Lost 3 weeks. November 18th.

National Coal & Oil Co.: John P. Graham, miner. Jaw Chas. Blaine, driving. Spreader bar worked out hook came bone broken by slate fall. January 12.

Southern Tidewater Coaling Co., same mine as foregoing: Chas. Blaine, driving. Spreader bar worked out, hook came loose from car; Blaine fell and car ran over him, bruising arm and dislocating hip. October 23d.

Webster County.—Providence Coal Co.: Elihu Foard, helper on electric chain mining machine. When tightening jacks stepped off machine too close to chain, which was in motion. Right foot so badly cut as to render amputation necessary. June 17th.

Sebree Coal & Mining Co.: Allen Mauker was caught by coal from blast and disabled for ten days. February 24.

Same company: Bob Bowman and Carrie Noel, burned by blow-out shot. Disabled 19 days. April 27th.

Same company: Elmer McMullin, driver. Foot mashed by being caught between track and loaded car he was hauling. (Extent of injury not stated). May 2d.

Same company: Ben Yarbrough, driver. Car jumped track, jamming his left arm and breaking the small bone. June 27th.

Same company: Monroe Tapp, miner. While on main entry car jumped track and caught his foot between car and side of entry. Lost 15 days. In August.

Same company: Jack J. Rudey, miner. Returned hanging shot; right leg broken and body badly bruised. November.

Whitley County.—East Tennessee Coal Co.: Frank Lovett, miner. Back injured by falling slate while robbing a pillar. Lost two or three months, probably. February 28th.

Stearns Coal Co.: An explosion on March 3d injured the following: Jno. McElroy, rib fractured and neck and ear burned, contusion on left leg below the knee, and lungs injured by gas and smoke; Henry Youngblood, hands burned, contusion on face and left shoulder and arm and lungs injured by gas and smoke.

Same company: W. H. Mallory, tippie hand. Fell from tippie; concussion of brain, contusion on left shoulder and arm. June 30th.

Same company: Jno. Monroe, miner. Car on switch failed to clear car on main track; fingers caught between cars and third finger of left hand dislocated. November 24th.

Same company: James Wallace (outside the mine) was passing in front of entry at the time a small explosion, due to windy shot, occurred. Was carried about 20 feet over a dirt pile; contusion on left side and head, but not serious, December 29th.

VII.

ACCIDENTS FOR 1906.

For the calendar year 1906, 195 noteworthy accidents were reported, of which 40 were fatal. Of the fatal accidents, 29 occurred inside the mine, 5 in shafts, and 6 on the surface. Of the 155 non-fatal accidents, 88 were serious, and of these 83 occurred underground, 1 in shaft, and 4 on the surface.

According to causes, the accidents were as follows:

Explosions of	Killed.	Injured.
Gas -----		8
Dust -----	2	--
Powder -----	1	4
Falls of roof		
In rooms -----	18	35
Other causes		
In mine -----	8	100
In shaft -----	5	2
On surface -----	6	6
	40	155

A summary of the fatalities, with coal raised per death, etc., has already been given. Following is a descriptive list of such accidents.

DESCRIPTIVE LIST OF FATALITIES, 1906.

Bell County.—Big Hill Coal Co.: W. J. Thomason, car material. Cause of his fall unknown. Left wife. October 16th.

Edward Blake, Lessee Black Bear mine: George Gooch miner. Killed by fall of slate in cross-cut he had just started. Left wife and two small children. June 12th.

Excelsior Coal Co.: Robert Redman, knuckle man, 16 years old. Attempted to jump on moving cars for a ride. March 12th.

Same company: Mack Johnson, who worked on knuckle, ran to catch a trip of cars after they had started up incline, missed his hold and fell through trestle. October 31st.

Same company: James Miller, driver, run over by mine car: skull crushed. December 13th.

Straight Creek Coal & Coke Co.: Albert was killed by a side fall in entry; was driving. February 13th.

Straight Creek Coal & Mining Co.: Perry Smith, laborer on tipple. Killed instantly by a runaway car. Wife and five children. February 1st.

Winona Coal & Coke Co.: J. F. Sprinkles, contractor on stumps and pillars. Killed by fall of slate. Wife and son. May 21st.

Henderson County.—Magnolia Coal & Mining Co.: Henry Short stuck a pick in a keg of powder; explosion followed and he was fatally burnt. Outside. In October.

Hopkins County.—Rose Creek Coal Co.: Robert Campbell, while dumping tub at new shaft was struck by tub after it was dumped and knocked off platform into the shaft. Wife and three children. In October.

St. Bernard Mining Co., No. 11 mine: John D. Moore, loader. Killed by fall of roof. Was notified by two fellow-workmen to keep away from it, but nevertheless deliberately walked under it. February 15th.

Same company, same mine: Dan Mitchell, machine helper. Killed by fall of coal from slip. Knew about the slip, but,

since coal seemed solid, took chances and cut into it. December 19th.

Johnson County.—Acrogen Coal Co., Wheeler No. 1 mine: "Car ran over one man; died from injuries." In September.

Knox County.—Bennett Coal Co.: Ed Bennett, killed by fall of slate in airway. Nov. 5th.

Hughes Jellico Coal Co.: William Walker, tiphouse man. Killed by Monitor. November 19th.

Lawrence County.—Peach Orchard Coal Co.: David Spence, killed instantly by fall of slate. Was driving entry and allowed the draw-slate to get 9 feet, 3 inches behind him. Wife and two minor children. July 25th.

Lee County.—McGuire Coal Co.: Charles Hamilton. Killed by falling slate. Wife and three children. November 5th.

Richardson Coal Co.: J. J. Jackson, fatally injured by fall of slate. Wife and none children. March 23d.

Muhlenberg County.—Black Diamond Coal Co.: James Mosely fell down shaft. Wife and three children. September 13th.

Same company: James Dawson, fatally burnt by gas. "Entry had been stopped five days, waiting for crosscut from air course. Was marked on bulletin board by fire-boss, and Cal Dawson, who was driving the entries, took Jim, his brother, in there regardless of bulletin." October 2d.

Crescent Coal Co.: A. W. Meddlers, railroad weighman, was working on the cage; latter fell to bottom of shaft. Head crushed, probably by chain blocks which fell at same time. First fatal accident in about eighteen years. October 6th.

W. G. Duncan Coal Co.: Will Carroway, killed while helping put mine car on track. Head, neck or shoulder seems to have struck trolley wire and he fell off car and died. Wife and two children. August 25th.

Ohio County.—Fordsville Block Coal Co.: Nathaniel Brook, killed by fall of slate while taking down standing shot. Wife and four children. October 8th.

McHenry Coal Co., McHenry mine: A. P. Phelps, loader, killed by fall of slate. Wife and six children July 1st.

Union County.—Waverly Coal & Mining Co.: Freeman Raley, driver, fatally injured by lump of coal falling down

shaft while he was ascending in the cage Coal tore away the bonnet of cage and struck Raley on head. July 24th.

Webster County.—Sebree Coal & Mining Co.: Bud Montgomery, pumpman. Thrown from cage while being hoisted from mine and fatally injured. Wife and two children. July 9th.

Same company: Dud Boyd, caught by blast, blown against prop and skull fractured. Died three days after injury. September 15th.

Webster County Coal Co.: Elburn Dorris (not an employe of company, but in mine with his brother), killed by fall of slate. August 7th.

West Kentucky Coal Co., Colliery G.: Wm. Dills, machine hostler. Fatally injured by fall of coal while he was shoveling from machine. Supposed to have come from a slip. May 24th.

Whitley County.—Campbell Coal Mining Co.: Tom Smith, killed by slate fall. June 5th.

Dowlais Blue Gem Coal Co.: W. H. Worden, killed by fall of slate at face of entry. Wife and four children. January 5th.

Same company: David Hatfield, killed by fall of slate. May 9th.

East Tennessee Coal Co.: Wm. Lay, fatally burned by powder. January 9th.

Same company: Harve Coburn, killed by fall of slate. October 13th.

Same company: Joe McDaniel, killed by slate fall. December 7th.

Jellico Coal Mining Co.: Cornelius Slatten, killed by fall of slate, on May 22d. Detailed report of accident is as follows: "The accident happened in room 16 on the left hand side of the Woods entry. This place had been driven toward outcrop of seam about 46 feet from the entry. At 31 feet from entry a water-way had been driven to the surface. This working place was not more than 12 feet wide in any place. Mr. Jonathan Jenkins, the mine foreman, had been in this working place less than 30 minutes previous to accident, and had suggested to Mr. Slatten to put up some props as a safeguard. Props were on hand in the place, having

been left there by the company men who had timbered the water-way, and which Mr. Jenkins had authorized him to use, and which he said he would. He sounded the top in the presence of Mr. Jenkins and it sounded solid, and Mr. Slatten expressed himself that he did not think props necessary at all, but that he would put some up. After Mr. Jenkins left the room, he fired a shot in left hand corner of room and took an empty car in to load, and had put in a few shovels full of coal, when a piece of slate, rather circular in shape, about 8 feet 6 inches in length and width, fell on him, one edge falling on the car and the other falling on him and breaking his neck, death being instantaneous." Signed, Jellico Coal Mining Co., W. T. Lewis., G. M. Deceased left wife and seven children.

Main Jellico Mtn. Coal Co.: C. N. Lewis, miner, mashed through hips by fall of slate in room on September 17th. Died October 5th.

Procter Coal Co., Grinstead mine: Jas. Moore, killed by fall of slate on entry. May 17th.

Stearns Coal Co.: Joe Green and Geo. Robinson, killed by explosion. "Probably windy shot." Robinson left wife and two children. March 10th.

NON-FATAL ACCIDENTS FOR 1906.

Serious accidents include fractures, dislocations, loss of an eye, bad sprains, injuries necessitating amputation, or which in any way endanger life, and those which necessitate long confinement or from which lameness or continued disability may result. Other accidents, though they may be painful, are usually regarded as not serious.

It is not always easy to determine from a report as received from the mine, whether the accident reported was serious or not; or, if manifestly not serious, whether it was in fact such as should be reported, or slight and of no statistical importance. It would materially aid the Chief Inspector in the preparation of this report if mining companies would in all instances make such reports as will plainly show how an accident is to be classed.

Omitting the slighter ones, 155 noteworthy non-fatal accidents were reported for the calendar year 1906. Following a summary of them:

CAUSES.	Serious		Not Serious		Total
	In	Out	In	Out	
Fall of top (slate or gob), -----	23	-----	12	-----	35
Fall of coal -----	4	-----	3	-----	7
Side fall in entry -----	1	-----	-----	-----	1
Cars and collisions -----	21	-----	9	-----	30
Tamping (premature blast), -----	4	-----	-----	-----	4
Blown-out shot -----	-----	-----	2	-----	2
Blown-through shot -----	-----	-----	2	-----	2
Returned on shot -----	-----	-----	1	-----	1
Caught by shot -----	1	-----	2	-----	3
Mining standing shot -----	2	-----	-----	-----	2
Ignition of gas -----	1	-----	7	-----	8
Powder explosion -----	4	-----	-----	-----	4
Smoke explosion -----	-----	-----	4	-----	4
Mining machine -----	6	-----	3	-----	9
Kicked by mule -----	-----	-----	5	-----	5
Miscellaneous -----	14	2	14	1	31
On slope -----	2	-----	-----	-----	2
On tippie -----	-----	1	-----	1	2
On trestle -----	-----	1	-----	-----	1
In shaft -----	83	4	64	2	153
	-----	1	-----	1	2
Total	83	5	64	3	155

Bell County.—Bell Jellico Coal Co.: James Gangas, leg broken and skull fractured by fall of coal in crosscut. September 28th.

Excelsior Coal Co.: Andrew H. Beck, leg broken by slate fall. March 27th.

Same company: Clarence Thompson. Leg broken by fall of slate. April 16th.

Shamrock Coal Co.: Wm. Austen. Leg broken by slate fall. September 4th.

Straight Creek Coal & Coke Co.: James Hinkle. Leg badly broken about hip by side fall in entry. February 13th.

Same company: H. B. Ruckodoo, mashed through hips and back by slate fall. Paralysis expected. November 26th.

Turner Coal Co.: Alonzo Baker; toes mashed by bank car. Laid up ten days. July 16th.

Boyd County.—Princess Land & Mining Co.: Willard Shelton; fell off a trestle and broke arm. In November.

C. H. Wurts, Lessee A. I. & M. Co's. No. 8 mine: Daniel McKnight; leg bruised and body strained by fall of coal. Off two months or more. June 1st.

Carter County.—Eastern Kentucky Railway's Lost Creek mine: Lon Thompson, 14 years old, working with his father and another man, drawing stump. Leg broken by fall of slate. "G. Thompson, the father, had been notified by mine foreman to take down slate." April 3d.

Strait Creek Coal Co.: Milliard Crum and Joseph Cain, badly burned by explosion of slate shot they were tamping. Crum lost a thumb and suffered scalp wounds. Cain lost left eye and had left arm broken. June 16th.

Daviess County.—Overstreet & Rudy: Wm. Lanham. Riding in an empty car, without mule, down grade and going fast; car stopped suddenly. Nose broken. Nov. 12th.

Same company: Oscar Simmons; dropped spark off bank lamp into keg of powder; badly burned. November 27th.

Hancock County.—Fenley Coal Co.: J. W. Burnett, "roof timber; two ribs loose from breast bone, elbow slightly fractured; could not work for three weeks; is o. k. now, Jan. 31st." Just how this accident occurred is not plain. Date, January 7th.

Henderson County.—Magnolia Coal & Mining Co.: Ed Posie, powder-burned by blown through shot. While in his room "was notified that a rib shot was going to be made in the other room and would not come out." Not serious. In June.

Same company: Richard Attie; badly burnt by explosion of keg of powder. Explosion caused by Henry Short (who was killed), sticking a pick in the keg. Outside. In October.

Hopkins County.—Brasher Coal Co., Royal mine: Sam Oats, driver; failed to stop at crossing; ran into trip of load with empty car; crushed between loaded car and entry pillar; rib broken. March 12th.

Same company and mine: Geo. Faulkner, loader, while helping on mining machine tripped on a piece of coal; foot was caught by machine chain and mangled; laceration of flesh to the extent of injury. February 5th.

Same company: Ed Thompson struck by team and ankle sprained. April 7th.

Same company: Bob Hughes; back bruised by falling slate. April 26th.

Carbondale Coal & Coke Co.: Warren Payton; shoulder dislocated by fall of slate while drawing entry pillar. March 6th.

Same company: James Bush. Foot hurt by falling slate. Off 25 days. June 25.

Same company: Rob Johnson; jumped on moving car close behind mule, causing latter to run off; car jumped track; one of Johnson's fingers was caught between car and rib and so injured that amputation was necessary. August 16th.

Crabtree Coal Mining Co.: John and Willie Huddleston, coal loaders; struck by fall of slate while loading. Laid up ten days as result of bruises. May 18th.

Same company: Ben Nichols, driver; while driving, mule stepped on end of loose timber in mine; other end flew up, caught Nichols's right leg between timber and front end of car and broke leg bone. September 12th.

Same company: Arthur Reeves, driver; mule stepped on piece of a tie, latter flew up, caught right leg between tie and car and broke both bones of leg just above ankle. November 17th.

Daniel Boone Coal Co.: Henry Parker, loader; bruised about hips and body by fall of gob. No bones broken. December 13th.

Nortonville Coal Co.: No. 1 mine: Charles Francis; superficially burned on face, shoulders and arms by igniting gas in abandoned room, which "he entered over prooper danger signs." Confined three weeks. December 3d.

Oak Hill Mine of Brasher Coal Co.: John Vickery; left hip bruised and one rib broken by being jammed against entry pillar by mine car. Lost three weeks in May.

Reinecke Coal Mining Co.: Will Lewis; while jacking up mining machine; first finger of left hand broken and second and third ones mashed. August 15th.

Same company: Wm. Earle, driver; left ankle sprained in a collision, Sept. 28th.

Same company; David Jackson, cager; left hip injured by loaded car running on him while he was caging. October 23d.

Same company: Harris Dawson, laborer; was riding on mine car, latter jumped track and caught his left leg between first and second car; leg badly bruised. November 28th.

Rose Creek Coal Co.: Floyd Parks, machine hostler; thumb mashed, necessitating amputation. Was holding nips in machine, same slipped off of blocks and caught his thumb in cogs. In May.

Same company: Jno. Wiley, machine runner; machine ran off of track and caught him between rib and sprocket of machines (nature and extent of injury not stated). In March.

St. Bernard Mining Co., Arnold mine; Geo. Mattox, loader; lump of coal rolled down and mashed small toe. Lost 8 days. January 31st.

Same company and mine: L. D. Hawkins, machine man; coal fell from face on his machine and while removing it draw slate fell from roof, cutting his scalp and lip. Lost nine days. In March.

Same company and mine: Philip Hawkins, trapper; when empty car passed through door, light went out, brake lever caught his arm, he fell and fractured bone in arm. Lost 20 days. May 24th.

Same company and mine: Robert Sells, loader; arm broken by fall of slate. October 10th.

Same company and mine: York Wimberly, driver; car jumped track, caught hand between car and rib, and hand was cut badly and wrist broken. Lost 61 days. October 8th.

Same company, Barnsley mine: Walter Long, driver; empty car jumped track, jamming him against rib; left knee sprained. January 24th.

Same company and mine: Lewis Chalmer, loader; big toe broken by piece of coal rolling down from pile. September 18th.

Same company and mine: Geo. Hill, driver; mule started suddenly, roofed Hill's elbow and latter was broken. Lost 32 days. October 27th.

Same company, Earlington No. 9 mine: Ben Medley, loader; foot cut by slate fall. Lost 12 days. January 9th.

Same company and mine: Ray Level, loader; side bruised by slate fall at face. Lost 10 days. February 26th.

Same company and mine: L. E. Groves, laborer; was letting timber cars run down slope, cars got away and ran over groves; bruised, cut, and right leg broken below knee. August 9th.

Same company and mine: Chester Sage, driver; coupling cars, motor started and squeezed him; collar bone broken. October 5th.

Same company, Earlington No. 11 mine. B. A. Fox, loader; piece of gob fell and cut his head while he was pulling coal down from face. Lost 19 days. January 1st.

Same company and mine: B. F. Todd, hostler; machine jumped the board, struck him in shoulder and sprained it. Lost 50 days. February 1st.

Same company and mine: Roy Jeffreys, loader; gob loose on pile of coal slipped down and broke one of his arms. February 7th.

Same company and mine: J. C. Morton, driver; struck by piece of roof, on entry. Lost 11 days. June 11th.

Same company and mine: Thos. Favor, machine miner; cut into a slip, coal came down and broke his leg, knew he was cutting into a slip, but coal sounded solid and he took chances. December 19th.

Same company and mine: Will. Biles, driver; arm badly bruised by being caught between rib and car while he was slewing latter, December 3d.

Same company, Hecla mine: John Neb, miner; cutting a heel, struck a slip and coal fell on him; body bruised shoulder and hip, Lost 60 days. January 29th.

Same company and mine: Jack Franklin, driver; mule stepped on foot; lost 16 days in March.

Same company and mine: Robert Chastine, hostler; unloading machine which skidded and broke his leg. May 3d.

Same company and mine: Geo. Berry, driver; was hauling loaded car which jumped track and broke one of his arms. June 20th.

Same company and mine: Robert Howal, loader; four fingers mashed by falling piece of slate. Lost 18 days. September 26th.

Johnson County.—Acrogen Coal Co.: Christopher C. Price; can of powder ignited while making cartridge; face and hands burned; recovered in five weeks. February 22d.

East Kentucky Coal Co.: Shady Grim; arm broken by mine car. May 30th.

Meek Coal Co.: Wash Brown, farmer-miner; hips and legs bruised by fall of slate. "kept bed a few days." January 25th.

Knox County.—Bennett Coal Co.: "One person slightly injured by going back on shot; three more were injured by powder smoke explosion; all were back to work in 30 days." In November.

Bennett Jellico Coal Co.: Mat Carter and Clyde Caddell, injured by a fall of slate. Report is: "Were working in No. 2 room off Main entry, said room having been driven up to the limit; they were cutting across pillar for purpose of extracting said rib or pillar. Coal was undercut by machine. They put a hole on rib for purpose of breaking down said coal. By reason of boring said hole too deep, same being 17 inches in solid coal, and overcharging said hole, they discharged all the timber supporting the roof. Upon discovering the result of shot, they endeavored to reset said timber, when portion of roof fell, injuring Carter in back slightly and fracturing one of small bones in leg above ankle. Caddell received

only sprained ankle; he returned to work the 8th instant (January.) Carter is convalescing; will be able to resume work in a week or ten days." December 10th

Coalport Coal Co.: Wm. Fannon, received scalp wounds and bruises on body, by fall of top coal. Confined 10 days. No date given.

East Jellico Coal Co.: Peter Miracle, struck by falling slate; lost a week, March 6th.

Matthews Jellico Coal Co.: O. P. Garland, miner; head and shoulders hurt by falling slate; disabled about two weeks. No date given.

Same company: Tom Valentine, miner; struck by flying coal from a shot; hips and legs bruised; disabled about two weeks. No date given.

North Jellico Coal Co., Bertha mine: J. J. Robinson, loader; seriously but not dangerously injured about the ribs by entry timbers being blown down on him while pulling stumps or pillars. January 22d.

Same company and mine: J. C. Allen, pick miner; both bones of right leg broken below knee by fall of slate. "Was shooting down the coal and had neglected to set prop to hold the top slate, which came down with the coal." August 13th.

Same company: Wilton mine: Art Preston, motorman; while coming out of 8th Left Cross-entry with 23 loads, allowed his train to get too close to Main entry before stopping for signal to come out. When he tried to stop, he was too close to the trap-door, and, being on a down-grade, the heavy train ran him through the door, telescoping a trip of loads which was going out on the Main entry. In going through the door, a piece of brattice timber was torn down, bruising Preston about the breast and breaking his collar bone. He was confined to the house a couple of days. March 26th.

Same company, same mine: Marion Sams machine runner; struck by some cars which became uncoupled from trip at the top of the grade in 10th Left entry and ran down to head of entry where Sam's machine was located; right leg so crushed that amputation was necessary. August 14th.

Same company and mine: J. B. Williams, air machine runner; was widening a room which was traversed lengthwise by a hill-seam; had knocked out and replaced one prop and

made one cut, and had knocked out a second prop which he intended to reset as soon as he got machine on board preparatory to making second cut, but slate fell before he could complete the work, striking him on the head and forcing his face down on the machine handles. Nose and upper jaw bones badly fractured. Oct. 2d.

Same company and mine: Charles Engle, machine runner; spinal column fractured by fall of slate while cutting a break-through. Will probably be a helpless cripple. November 22d.

Ross Jellico Coal Co.: James McDonald, bruised by fall of slate. Off one week. February 21st.

Rossland Coal Co. (successor to Ross Jellico Coal Co.): John Hart, mashed and bruised by fall of slate. July 17th.

Morgan County.—Kentucky Block Cannel Coal Co.: E. Mullins, cut on knee by being cut by derailed car between car and entry rib. Probably disabled two weeks. In July.

McLean County.—Memphis Coal Co.: Ed Wilson, ankle dislocated or broken while holding car back by dragging foot on ground. July 11.

Same company: S. W. Holland, miner; right shoulder and bowels hurt by fall of coal he was mining out. Not serious. August 27th.

Muhlenberg County.—Beech Creek Coal Co.: John Camplia; shoveling in a new shaft that was being sunk; accidentally struck on hand with shovel by fellow workman and finger cut off. In August.

Black Diamond Coal & Mining Co.: Ed Boyd, Ed Prince, Tom Creasy, Ed. O'Neill, Roy Bennett and Ben Hollman, burnt by ignition of fire-damp; not seriously. W. R. Garrett, foreman, blown against side of entry, at the same time and head badly cut. No. 1 room on 4th West Blind fell in during night of July 11th, and with the fall came a pocket of water. While looking for the water one of the men got up into the fall, igniting the gas. July 12th. (See special report of A. G. Spillman in regard to this explosion.)

Crescent Coal Company: Samuel Gregory, driver; foot caught between bumpers by car derailling as he came out of room and bone in three toes broken. April 18th.

Same company: Robert Wilson, machine runner; two fingers caught in gear wheels of machine and crushed off. October 16th.

W. G. Duncan Coal Co.: Anderson Franklin, driver; got off car while coming up 4th South, was caught between car and rib and collar bone broken. In February.

Same company: Logan Thompson, while superintending unloading of lot of bank cars was knocked off; right cheek cut and both bones in right arm broken. May 11th.

Greenville Coal Co.: Jess Russell, driver; fell from his seat, was run over by car and body and one arm crushed. March 2d.

Same company: Hamp Steel, bradder, caught between cutter-head of machine and rib, or sulphur band near rib, and leg cut and mashed by bits. Disabled about six or seven weeks. July 14th.

Louisville-Atlanta Coal Co.: Shelby J. Morris; leg broken just above ankle by fall of standing shot. December 13th.

R. Morgan Coal, Coke & Mining Co.: "Zeb Jones (or Tones?) age 21, hand crushed." In March (A very unsatisfactory report.)

Same company: Bud Mitchell, kicked by mule April 26th. Bennett Underwood, kicked by mule, April 27th, Charles Curtley, kicked by mule, April 28th. Nature of injury not stated in any case, but injury pronounced "not serious."

Same company: Herman Garrett, driver; hand mashed. Ed. Stevens, driver, kicked. Pronounced "not serious." In July.

Same company: J. H. Bolten, miner; burned about hands and face by shot; "not seriously." September 10th.

W. A. Wickliffe Coal Co.: Ike Cash, miner; burnt on hands and face "by smoke explosion." October 24th.

Ohio County.—Central Coal & Iron Co., Render mine: Morton Harrel, kicked on side of face by mule; result not serious. August 28th.

Deane field Coal Co.: Paul Sims, miner; right arm crushed and broken in two places and right leg bruised by fall of roof. June 21st.

McHenry Coal Co., Echols mine: E. W. Willcox, top cager; fell down and loaded car ran over his leg; off 15 days.

Same company and mine: Ernie Rowe, machine runner; thumb cut off at first joint (in some manner not stated). July 1st.

Same company, McHenry mine: Dick Southard, bottom cager; struck by loaded car running down slope, (due to breaking of rope) and humerus broken. January 8th.

Pike County.—Vulcan Coal Co.: Charles Sheffey, miner; skull fractured by premature blast. Shot exploded while he was tamping it. At last accounts was getting well. October 18th.

Pulaski County.—Eagle Coal Co.: Samuel Thomas, got finger broken while coupling cars. Presumably outside. In August.

New Cumberland Coal Co.: B. Higden, injured by fall of roof. Lost six weeks. In May.

Union County.—Bell-Union Coal & Coke Co.: Ned Easley, left foot mashed while unloading a car of mine cars. Not serious. October 29th.

Ohio Valley & Mining Co.: Chas. Boylls a loader; injured in face and breast by premature blast. Was tamping a shot. Off three weeks. In February.

Same company: Albert Baumbest, driver; two ribs broken in collision with a machine truck. August 1st.

Same company: Eugene Reese, driver; while driving with loaded car had hand on top of coal, the latter roofed and hand was mashed. Off possibly a month. October 27th.

South Tidewater Coaling Co.: Marshall Havions, loader; leg broken by fall of slate. February 3d.

Same company: J. L. Harmon and his son Herschel, (latter 14 years old) were burnt about face and hands by tamping of shot blowing out. April 23d.

Same company: Martin Brown, driver; while pulling an empty car arm was broken by collision with loaded car. June 29th.

Same company: J. M. Brown, "hip bone torn loose from spine and hurt internally" by fall of slate; "will get well." December 27th.

West Kentucky Coal Co., Colliery Co.: Clarence Carlile, driver; foot mashed by wheel of mining machine he was moving. January 8th. Same man had foot mashed January 1st by car running over it his mule having started sooner than he expected.

Same company and mine: Joe Grinston, driver; caught between derailed car and rib and pelvic bone slightly fractured. February 24th.

Same company and mine: Ed. Tucker, cager; while caging a car, was caught by trip of loads which ran down too far after being cut loose from motor and foot was mashed between car and cage. April 21st. On same date A. B. Hancock, cager, had both feet mashed in same way.

Same company and mine: Jno. Gaines driver; bumped into mine car, by fast driving, and foot was mashed across in-step. Off 4 or 5 days. May 22d.

Same company and mine: Jas. Bishop, 14 years old; **coupling cars**; was sitting on motor; motorman got signal to back and Bishop's foot was caught between motor and ground, spraining ankle. July 6th.

Webster County.—Providence Coal Co.: Walter Mays, a tipper; foot bruised by being caught between car and tie when taking car off cage. Lost probably three weeks. November 23d.

Sebree Coal Co.: James Cissell, miner; struck on head and right arm by fall of slate; lost three weeks. In January. In same month, Joe McIntire, foreman, had right leg severely cut by being jammed between cars; lost two weeks.

Webster County Coal Co.: Ed Silvia, ankle broken by fall of gob. January 30th.

Same company: Raymond Feeney; stopped in break-through near shots and bruised on shoulder and face. January 30th.

Same company: Urey Simpson went too close to another man's shot and was slightly burned on face and arms. May 1st.

Same company: Gilbert Davis removed a prop in his room and was slightly hurt by resulting fall of slate. August 7th.

West Kentucky Coal Co., Colliery G.: Trant Wright, cager; was carrying a bank rail which he dropped on the signal wire just as he started across the cage; was caught by the rising cage and badly bruised about the face. July 19th.

Same company and mine: Geo. Reece, driver; foot and ankle bruised by derailling of car; disabled about three weeks. August 7th.

Same company and mine: Riley Chandler, "received a stroke by means of the electric cutting machine being pulled toward him, whom he was hoisting for." Thomas Williams "received a torn hand by means of driving and being or having his hand caught between the coal and the roof." Austin Garrette "was hurt on the head slightly, not serious." In September. (Not a clear report.)

Same company, Colliery H.: Carl Williams, driver; while pushing empty car from cage was struck by piece of coal from above and arm broken. March 30th.

Same company and mine: Thomas Williams, driver; caught between a loaded car and slate. Disabled about two weeks. June 14th.

Same company and mine: D. M. Phelps "had his hand caught between car and coal." September 22d. (Not a satisfactory report.)

Whitley County.—Anderson Coal Co.: Joe Morning, caught by shot; nature of injury not stated, but pronounced not dangerous. Was firing one shot and trying to fire another before the first should explode. December 28th.

East Tennessee Coal Co.: Thos. Lay, badly burned about face and hands by powder. January 9th.

Same company: A. J. Anderson, mashed by fall of slate on entry. January 31st.

Louisville Property Co.: Geo. Peace, bruised and mashed by being caught between car and entry pillar; jumped out of car without warning driver, not serious. In March.

Same company, Birdeye No. 1 mine: Ira Long's arm was so injured by slate fall as to necessitate amputation. In October.

Mt. Morgan Coal Co.: Floyd Smith, a trapper, 14 years old; leg broken by being struck by air door. October 2d.

Stearns Coal Co.: The very unsatisfactory report is: "J. H. Stephens, miner, 35 years. July 30. Broke left arm.—carelessness."

Same company: Jas. Barker, miner; foot mashed by fall of coal from top; disabled five days. August 16th.

Same company: Jno. White, leg broken above ankle by fall of coal when mining loose shot. August 7th.

Same company: Isham Brown, shot firer; shot blew through pillar before he could make circuit to next room, and he was cut in face and jaw with additional slight bruises. October 23d.

CHAPTER VII.

NOTES ON THE MINES.

Out of the 47 coal counties, exclusive of those that have only small pockets, or outliers of coal, or an inconsiderable fringe of either coalfield, only 26 are producing commercial coal at this time. At least 39 of the counties are capable of maintaining a large annual production for very many years. In order to systematize and expedite mine inspections and at the same time keep in harmony with the natural trade relations of the counties, the counties have been grouped into four districts, although in only three of the districts is any coal mined for shipment at this time. The districts are as follows:

WESTERN DISTRICT.—This includes Butler, Christian, Daviess, Hancock, Henderson, Hopkins, McLean, Muhlenberg, Ohio, Union, and Webster counties; a total of 11 in which commercial mining is now carried on. To these are to be added, Caldwell, Crittenden, and Edmonton, which can produce considerable coal for the market, and Breckenridge and Grayson, which can produce enough coal to be of importance to local users. While it is true that Warren, Logan and Todd counties have some coal along the rim of the field, and that there are outliers of coal in Livingston, the deposits in those counties are in fact not of great importance. The total number of counties in this district that can maintain a considerable production may be taken as 14, while two more have deposits of considerable local importance, making 16 in all. As matters now stand, a larger percentage of the counties in this field are now producing and shipping commercial coal than is the case in the Eastern Field.

SOUTHWESTERN DISTRICT.—This is a part of the Eastern Coalfield, and includes Bell, Knox, Laurel, Pulaski, Rockcastle, and Whitley counties, in which commercial mining is now carried on. It also includes the splendid coal county of Harlan, from which no coal is shipped but which has a great and not far distant future; together with Clinton, Jackson and Wayne, which fall to a lower position with respect to possibilities.

NORTHEASTERN DISTRICT.—This includes Boyd, Breathitt, Carter, Floyd, Johnson, Lawrence, Lee, Morgan and Pike, nine counties in which shipping mines are operated. The great but as yet commercially undeveloped coal counties of Knott, Martin and Magoffin, and the less important counties of Greenup and Elliott also belong to this district. Eventually, Breathitt and Lee counties will go into another district.

KENTUCKY RIVER DISTRICT.—Since Breathitt and Lee are at present treated as belonging to the Northeastern District, this district has not a single commercially important mine in it, and yet it has a great future as a shipping district. It includes Clay, Leslie, Letcher, Owsley and Perry counties; and Wolfe and Menefee may be considered a part of it.

Out of the 25 probable large shipping counties in the Eastern Field, only 15 are now shipping, making 60 per cent. of the total. Of the 14 probable large shipping counties in the Western Field, 11 are now shipping, making nearly 78.6 per cent. of the total. But, while the Western Field shows apparently a larger commercial development, one must not conclude that its possibilities are all known. The fact is that, notwithstanding the length of time in which large mining has been carried on in that Field, there are very large areas in it of which, because of topographic and geologic peculiarities, we know comparatively little. With the exhaustion of the

Ohio river coals in sight, mining capital from Pennsylvania and elsewhere is turning to the Western Kentucky Field for coal, and there is an insistent call for information concerning the possibilities of the less known parts of the field. The State Geological Survey is making an earnest effort to respond to the call. To that end we have pushed the topographic work, which is carried on in co-operation with the U. S. Geological Survey, in that territory during the last two years, and have done all that circumstances would permit to fill in the gaps in our field notes on the field. I may now confidently state, as the result of arrangements recently perfected, that another season of field work will enable us to complete the report on the field that we had hoped to issue ere now. It is believed that a short preliminary report may be made ready by the coming spring, but the unfortunate and continued illness of the Assistant whom I had at work in the field has delayed preparation of the more complete document.

NORTHEASTERN DISTRICT.

The following counties producing commercial coal lie within this district; namely, Boyd, Breathitt, Carter, Floyd, Johnson, Lawrence, Lee, Morgan and Pike.

	1905	1906
Output of bituminous coal, in tons.....	491,520	752,391
Output of cannel, in tons.....	86,110	63 012
Production of coke, in tons.....	917	None
Employes.....	1,571	1,915
Average number of 10-hour days worked in 1906.....		167

Note.—In order to prevent confusion, Mr. Spillman's reports for Christian, Hopkins, and Webster counties are placed with the counties forming that mining district; while reports of his inspections of mines which subsequently came under the supervision of Mr. Doss and of Mr. Cain are given under the mines to which they refer, properly identified and taking their proper precedence as to dates. His report for the Northeastern District follows:

REPORT OF A. G. SPILLMAN.

Prof. C. J. Norwood,
Chief Inspector of Mines.

Dear Sir:—I have the honor of submitting my report for the year ending December 31, 1906. It includes reports of inspections in the Northeastern District, all the mines of which are under my supervision, and of the inspection work in the counties of Christian, Hopkins, and Webster, in the Western District, the mines of those counties also being in my care. In addition, early in the year I made inspections in other Western counties, which subsequently were placed under the supervision of Mr. Doss, as follows: Utopia and Magnolia mines in Henderson county; Island mine, in McLean; Black Diamond and Wickliffe mines, in Muhlenberg, and the American, Sullivan and West Kentucky Colliery C. mines, in Union. I also made a few inspections in Mr. Cain's district, the Southeastern, before he took charge. Respectfully,

A. G. SPILLMAN,
Assistant Inspector of Mines.

Boyd County.

DAWSON BRANCH MINE.

P. O., Rush.

Transportation, C. & O. Railroad.

Operated by G. W. McNeal.

Inspected March 29th.—The mine was idle; furnace was not fired, consequently I could not accurately determine the quantity of air entering the mine. Upon examination, however, I found the furnace power inadequate to properly ventilate the mine. Written notice was served directing the company to provide a furnace of ample power.

Inspected July 21st.—The mine was again idle; no fire in furnace. A new furnace had been installed, however, and indications were that the ventilation would be satisfactory with a fire in the furnace. Drainage and timbering satisfactory.

MEADOW BRANCH MINE.

P. O., Rush.

Head Office, Mt. Sterling.

Transportation, C. & O. Railroad.

Owned and operated by the Adkins Coal Co.. Green Strother, President; Joseph Strother, Superintendent.

[1905.—Only one inspection could be made in this year. At the time visited, May 6th, provisions for ventilation were very poor.

Inspected March 29th, 1906.—The mine was almost exhausted, nothing remaining but some stumps. I could not make a thorough examination of the mine on account of its being partially flooded with water.

Inspected July 21st.—A new opening had been made across the ravine from the old mine, and all work consisted in driving the main entry and air course. The face of the main entry was 105 feet ahead of the air course. Written notice was served directing the company to stop the entry until the air course could be put up within 60 feet of the entry.

PRINCESS MINE.

Head Office, Princess.

Transportation, C. & O. Railroad.

Operated by the Princess Land & Mining Co., L. E. Carlton, President, Melrose, Mass.; J. H. Drake, Superintendent at the Mines.

[1905.—Only one inspection could be made, on May 5th, at which time all conditions were satisfactory.]

Inspected March 28th.—The mine was defective with respect to ventilation and drainage. The furnace was inadequate to properly ventilate the mine, and there was too much mud and water on the main entry. No lack of proper posting was observed.

Inspected July 27th.—The mine was idle except that four men were engaged in driving the Dawson entry. Natural means were depended upon for ventilation, which was very fair.

CLINTON No. 8 MINE.

Head Office, Ashland.

Transportation, C. & O. Railroad.

Operated by C. & H. Wurts, Lessees under Ashland Iron & Mining Co.

[1905.—One inspection was made, May 5th, at which date all conditions were satisfactory.]

Inspected March 30th.—All operations were confined to drawing stumps and pillars, and conditions were as good as could be expected, considering class of operations.

I found the mine idle on July 28th, and no inspection was made.

No. 12 MINE.

Head Office, Ashland.

Transportation, C. & O. Railroad.

Operated by C. & H. Wurts, Lessees under Ashland Iron & Mining Co.

Inspected March 30th.—The mine had been idle for some months, and had but recently resumed operations. Natural means were depended upon for ventilation. Written notice was served directing that the furnace be fixed each day the mine was operated.

Breathitt County.

JACKSON MINE.

Head Office, Jackson.

Transportation, Lexington & Eastern Railroad.

Operated by the Kentucky Union Co., Arthur Carey, President; A. S. Henry, Vice President and General Manager; W. T. Davis, Mine Foreman.

The coal is mined by one Ingersoll and seven Harrison pick machines. Power is furnished by a Norwalk compressor.

[1905.—One inspection was made, on June 15th. At that date some of the work had been carried too far ahead of the air, but upon the whole conditions were fairly good.]

Inspected March 12th.—All conditions were satisfactory.

Inspected August 3d.—Ventilation, drainage and timbering were satisfactory.

Carter County**BAILEY MINES.**

Mine Office, Rush.

Head Office, Ashland.

Transportation by C. & O. Railroad.

Operated by J. R. Bates, Lessee under Ashland Iron & Mining Co.

[In 1905 these mines were idle when visited. Comparatively little was done at them during the year.]

Bailey No. 1.—Two inspections were made of this mine, and the ventilation was defective each time. When inspected July 28th the ventilating current did not serve the working places, and the drainage was bad.

Bailey No. 2.—This mine was operated only a short while during 1906. I visited the mine twice, and found it idle on each occasion.

BOGHEAD MINE.

Mine P. O., Grayson.

Head Office, Riverton.

Transportation by Eastern Kentucky Railroad to C. & O. Railroad.

Operated by the Kentucky Cannel Co., Sturgis G. Bates, General Manager; John Petrie, Mine Foreman.

[1905.—When examined on May 3d all operations were confined to drawing stumps. Conditions were satisfactory.]

Inspected March 31st.—Natural means were depended upon for ventilation, and the air was not good. The entry roads were very wet and muddy.

Inspected July 28th.—I found that the old mine had been abandoned, and three new openings had been made near the old mine. Natural means were still depended upon for ventilation, but as the openings had only advanced a short distance, the air was not bad. Drainage, however, was bad. No neglect to properly timber was observed.

LOST CREEK MINE.

Mine Office, Willard.

Main Office, Riverton.

Transportation by Eastern Kentucky Railway to C. & O. Railroad.

Operated by Mine Department Eastern Kentucky Railway, Nathaniel Thayer, President, Boston, Mass.; Sturgis G. Bates, Vice President, Riverton; Arch Morris, Superintendent at Mines.

[1905.—When visited on May 2d, the mine was idle and the furnace cold, hence determinations as to quality of air could not be made. Brattice cloth was needed at bottoms of doors on room-necks.]

Inspected March 31st.—There were fifty-five persons employed underground, and the volume of air traveling the working places was not up to the legal requirements. The Eighth and Tenth Right entries were very dry and dusty. Written notice was served directing the company to keep their entries well sprinkled with water in the future.

This mine was idle most all of the time the balance of the year, and no other inspection was made.

NORTON BRANCH MINE.

This mine, formerly worked by the Norton Branch Coal Co., was worked out in 1905. When visited in May of that year such was its condition.

STRAIT CREEK MINE.

Mine P. O., Denton.

Transportation, C. & O. Railroad.

Operated by Strait Creek Coal Co., Kent Pritchard, Superintendent; Robert Stamper, Mine Foreman.

[1905.—When visited in May the men were out on strike and there was no hope of an early settlement.]

Two inspections were made of this mine in 1906, and on each occasion all conditions were satisfactory.

Floyd County.

PRESTON MINE.

Mine Office, Woods.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the Preston Coal Co.

This is a new mine for 1906.

Inspected July 21st.—The mine was defective with respect to ventilation. The furnace power was inadequate to properly ventilate the mine.

Inspected December 11th.—Ventilation, drainage and timbering were satisfactory.

Johnson County.

WHEELER MINE.

Head Office, Paintsville.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the Acrogen Coal Co., J. C. C. Mayo, President; Charles Keyser, General Manager.

The mine (a drift) was ventilated by a furnace until November, when a 16-foot Crawford & McCrimmon fan was installed. The equipment consists of a Goodman dynamo, 125 K. W.; four Goodman electric mining machines, and one 5-ton Goodman motor. This is a new mine.

Inspected March 22d.—Although the mine was in operation, there was no fire at the air shaft, natural means being depended upon for ventilation. Written notice was served, calling the attention of the company to the fact that this was in violation of the mining law, and directing that artificial ventilation be provided.

Inspected July 23d.—The face of the second right entry was 90 feet ahead of air, and there were two open breakthroughs between the main entry and its air course. In all other places conditions were satisfactory.

Inspected December 8th.—A door was needed between second and third entries, and a new door was needed on the mouth of second left entry. All conditions elsewhere were satisfactory.

FLAMBEAU (EAST POINT) MINE.

Mine Office, East Point.

Head Office, Paintsville.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the East Kentucky Coal Co., A. D. W. Smith, President, Wilkes-Barre, Pa.; H. Lavier, Superintendent, Paintsville, Ky. This is a new mine.

Inspected July 23d.—There were three separate openings, and twelve persons employed in the three openings. Natural means were depended upon for ventilation. Written notice was served directing the company to provide means for artificial ventilation. Drainage and timbering satisfactory.

Inspected December 11th.—A furnace had been installed since the preceding inspection, and all conditions were satisfactory.

MEEK MINE.

Mine, P. O., Meek.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the Meek Coal Co., J. N. Meek, General Manager.

[1905.—This was a new mine for this year. When examined on June 8th all conditions were satisfactory.]

Inspected March 22d.—The mine (a drift) is ventilated by a furnace. The furnace power at the time of this inspection was inadequate to properly ventilate the mine, consequently the ventilation was not up to the legal requirements.

Inspected April 17th.—A new air-shaft was being sunk, and the condition of the mine with respect to ventilation was somewhat improved, but was not satisfactory.

Inspected December 8th.—The new shaft was finished; a new furnace had been provided, and all conditions were satisfactory.

MUDDY BRANCH MINE.

Head Office, Paintsville.

Transportation, Big Sandy Division C. & O. Railroad.

The mine was operated by the Muddy Branch Coal Co., with J. C. C. Mayo, president, and Charles Keyser, General Manager, until September 1st, when it passed into the hands of the North East Coal Co., with A. D. W. Smith, President, Wilkes-Barre, Pa.; H. Lavier, Superintendent, Paintsville, Ky.

This is a new mine, opened in 1906, and only one inspection was made. It is a drift mine and ventilated by a furnace. When inspected December 12th the mine was in an excellent condition in all respects.

RITTENHOUSE MINE.

Mine Office, River.

Transportation Big Sandy Division C. & O. Railroad.

Operated by the Rittenhouse Coal Co., J. S. Rittenhouse, President; W. L. Walters, Superintendent of Mines. The mine is equipped with a Morgan-Gardner generator and three Morgan-Gardner electric chain mining machines. The mine, (a slope) is ventilated by a 10-foot Cole fan. The mine was opened in 1905.

Inspected March 23d.—On account of the lack of check curtains the ventilating current did not serve all of the working places. Drainage and timbering satisfactory.

Inspected July 25th.—All conditions were satisfactory.

I visited this mine December 8th. The bank was idle, on account of installation of electric plant, and no inspection was made.

GREASY CREEK MINE.

Mine Office, Williamsport.

Head Office, 60 Waldo Place,
Chicago.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the Sandy River Coal Co., F. A. Stacy, President, Chillicothe, Ohio; Willis Watson, Superintendent at mines.

[1905.—In June of this year the mine was idle and had been for some time, due, it was said, to disagreement over the wage scale.]

Inspected March 23d.—The volume of air entering the mine was not sufficient for the number of persons employed underground, and the current was not well conducted to the working places.

Inspected December 8th.—The mine was defective with respect to ventilation and drainage. Break-throughs were not made every 60 feet between the rooms, as required by law, and there was too much both of mud and water on the entry roads.

WHITEHOUSE MINE.

Mine Office, Whitehouse.

Head Office, Louisa.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by the Whitehouse Coal Co., Dr. Harry A. Wood, President; Col. Jay H. Northup, General Superintendent and Treasurer; George Bickford, Superintendent at mines.

[1905.—Only one inspection could be made, which was on June 9th. Both mines, the Kentucky Big Vein and the Four-Foot, were in good condition.]

Inspected March 24th.—The mine was idle. The furnace was not fired, consequently I could not determine the quantity of air entering the mine. The curtains and stoppings were in poor condition.

Inspected April 17th.—The current of air entering the mine was too weak to turn the anemometer. The furnace power was totally inadequate to properly ventilate the mine.

Shortly after the foregoing date of inspection the mine was closed down, and has not resumed operations.

Lawrence County.

PEACH ORCHARD MINES.

Head Office, Peach Orchard.

Transportation Big Sandy Division C. & O. Railroad.

Operated by the Peach Orchard Coal Co., John C. Welty, President, Canton, Ohio; O. P. Chatfield, General Manager, Peach Orchard, Ky.

The mine is equipped with a Norwalk compressor, three Harrison pick machines, and two Legg-Lechner (air) machines.

Annie Mine.—[1905.—Only one inspection could be made—on June 7th. Natural means were depended upon for ventilation, but preparations for building a furnace were under way. Drainage was miserable.]

This mine was inspected three times in 1906, but not until the last inspection, December 8th, were the conditions anything like satisfactory. Except that break-throughs were

needed between rooms 18 and 19 and 19 and 20 on the Main entry, there was no cause for complaint on the above date.

Minnie Mine.—[1905.—One inspection only could be made, which was on June 7th. Sufficient air was entering the bank, but was not properly conducted.]

This mine received three inspections during 1906. On each occasion the mine was defective with respect to ventilation. Drainage was satisfactory and no neglect to properly timber was observed.

Below you will find my report of investigation of the accident causing the death of David Spence.

Lexington, Ky., July 31st, 1906.

Prof. C. J. Norwood,
Chief Inspector of Mines.

Dear Sir:—On July 25th David Spence was instantly killed by a fall of slate in the head of the 5th Right entry of the Annie mine of the Peach Orchard Coal Co., at Peach Orchard, Ky. He, Spence, was 39 years of age and left a widow and two boys, one of them eleven and the other nine years old. On July 26th I investigated this accident. I found that the fall of slate was due to a slip. Spence was working in the 5th Right heading with Aris Frailey. Frailey said that Spence had gone down the entry some distance, to get a driver to move a car that was in the way, where he (Spence) wanted to tamp a hole. Frailey was tamping a hole in the left-hand corner of the headings, and heard Spence coming back to the head of the entry. He then heard the slate fall, and looking around saw that Spence had been caught by the slate. The piece measured 5 feet in length; $4\frac{1}{2}$ feet in width, and was about 12 inches thick.

TORCHLIGHT MINE.

Mine Office, Torchlight.

Head Office, Louisa.

Transportation, Big Sandy Division C. & O. Railroad.

Operated by Torchlight Coal Co. W. H. Rown, Jr., President; R. F. Vincent, Vice-president; Col. Jay H. Northup, General Superintendent and Treasurer.

[1905—This mine was idle throughout the year.]

Inspected March 23d.—The current of air entering the mine was too weak for measurement, and no provision had been made to send the air to the working places had there been any. The drainage was very bad, indeed. Shortly after this inspection, the mine was closed down and has not resumed operations.

Lee County.

NORMAN MINE.

Head Office, White Ash.

Transportation by Louisville & Atlantic Railroad, and also by connection with Lexington & Eastern Railroad.

Operated by the Beattyville Block Coal Co. J. L. Tompkins, General Manager.

Inspected March 15th.—The mine (a drift) was ventilated by a furnace. Ventilation was defective, the current not reaching the working places. The entry roads were wet and muddy.

Inspected August 4th.—There was no improvement in the ventilation and drainage since my preceding inspection.

CONTRARY CREEK MINE.

Mine Office, White Ash.

Transportation, Louisville & Atlantic Railroad, and also by connection with Lexington & Eastern Railroad.

Operated by South Fork Coal Company.

[1905.—The mine had been leased, May 5th, from the Contrary Creek Coal Co. by the South Fork Coal Co., with W. P. Azbell, General Manager. On June 14th the mine was in very defective condition as to ventilation, and drainage was bad on the Dog entry.]

Inspected March 15th.—The mine was idle on account of a strike. I found, however, that the air shaft was too small, and too near the crop. The air-course near the shaft was too narrow.

Inspected August 3d.—There was no fire in the furnace, although the mine was in operation. The drainage was bad on the main entry.

McGUIRE MINE.

Head Office, Beattyville.

Transportation, Louisville & Atlantic Railroad, and also by connection with Lexington & Eastern Railroad.

Operated by the McGuire Coal Company, Walker Jamison, General Manager.

[1905.—This mine was idle, and had been for three months, when visited in June. It was not possible to make another visit during the year.]

Inspected March 16th.—Ventilation, drainage and timbering satisfactory.

I visited this mine August 3d, but made no inspection, as the mine had been idle for some time and was idle on that date.

RICHARDSON MINE.

Head Office, Beattyville.

Transportation, Louisville & Atlantic Railroad, and also by connection with Lexington & Eastern Railroad.

Operated by Richardson Coal Co. J. C. Richardson, President; G. W. Gourley, Vice-president.

[1905.—The mine was inspected June 13th, though idle at the time. Indications were that with fire in the furnace ventilation would be satisfactory.]

Inspected March 16th.—All conditions were satisfactory.

Inspected August 4th.—The mine was idle and the furnace was not fired. There were two open break-throughs between the Main left entry and air-course. Near the bottom of the slope the drainage was bad.

Morgan County.

KENTUCKY BLOCK CANNEL MINES.

Mine Office, Cannel City.

Transportation, Ohio & Kentucky and Lexington & Eastern Railways.

Operated by the Kentucky Block Cannel Coal Co., W. DeL. Walbridge, President, New York City; M. L. Conly, Superin-

tendent. The coal cutting machinery consists of twenty Harrison and six Ingersoll-Sergeant pick machines. Power is furnished by two Norwalk compressors.

[1905.—These mines were inspected once, on June 16th and 17th, in 1905. Conditions were satisfactory.]

Brushy Mine.—Two inspections were made of this mine in 1906. As a whole the mine was maintained in a good condition.

No. 1 Mine.—Inspected twice in 1906, and found to be in a satisfactory condition on each occasion.

MAYFLOWER MINE.

Mine Office, Caney.

Transportation, Ohio & Kentucky and Lexington & Eastern Railways.

Operated by Mayflower Cannel Coal Co., successor to the Eureka Cannel Coal Co.

[1905.—No. 2 and No. 3 mines were inspected June 17th. The No. 2 had practically no ventilation. There was no furnace, the air-shaft was too small and the stack not high enough. In No. 1 seven persons were employed. An airshaft had been sunk and preparations were under way for a furnace.]

Inspected March 13th.—The face of the First Left entry was 100 feet ahead of the air, and the face of the First Right entry was 90 feet ahead of the air; consequently the ventilating current did not travel within the required distance of the working places.

Inspected August 1st.—The stoppings and curtains were in poor condition and too much air escaped to the return, that should have gone to the diggers. Drainage and timbering satisfactory.

WATSON MINE.

Mine Office, Caney.

Transportation, Ohio & Kentucky and Lexington & Eastern Railways.

Operated by the Watson Cannel Coal Co.

Inspected March 13th.—The ventilating current did not

travel the working places as required by law, although the volume entering the mine was ample.

Inspected August 1st.—Ventilation was satisfactory, but there was too much mud and water on the main entry. No lack of proper posting was observed.

WHITE OAK MINE.

Mine Office, Piedmont.

Transportation, Ohio & Kentucky and Lexington & Eastern Railways.

Operated by the White Oak Cannel Coal Co.

[1905.—No. 1 and No. 2 mines were inspected June 15th. Both mines were in satisfactory condition.]

Inspected March 14th.—The volume of air entering the mine was not strong enough to enable me to get a measurement. The curtains on the room necks were old and leaky. Drainage and timbering satisfactory. This mine was closed down shortly after this inspection was made, and has not resumed operations.

Pike County.

BORDERLAND MINE.

Mine Office, Borderland, W. Va. Tel. Office, Nolan, W. Va.

Transportation, Norfolk & Western Railroad, the coal being carried from the mines to the tippie at the railroad by aerial ropeway.

Operated by the Borderland Coal Co.; E. L. Stone, President, Roanoke, Va.; E. B. Fishburn, Secretary and Treasurer, Roanoke, Va.; L. E. Armentrout, General Manager.

Inspected March 27th.—The volume of air entering the mine was ample, but on account of the lack of check curtains on the entries the current did not travel the working places as required by law.

Inspected July 18th.—Drainage and timbering satisfactory, but the ventilation was defective.

No. 2 Mine.—Inspected July 18th.—This is a new mine and is ventilated by an 8-foot Stein fan. All conditions were satisfactory.

FREEBURN MINE.

Mine P. O., Edgarton, W. Va. Tel. Office, Dolorme, W. Va.
Main Office, Lynchburg, Va.

Transportation, Norfolk & Western Railroad.

Operated by Freeburn Coal & Coke Co., Frank P. Harman, President; James R. Gilliam, Treasurer; W. A. Young, Secretary; C. O. Smith, General Manager.

Inspected March 26th.—Sufficient air was entering the mines and traveling the entries, but, on account of the lack of check curtains on the entries, the rooms were without ventilation.

Inspected July 19th.—The same cause for complaint was noted upon this inspection as upon the preceding one.

EDGEWATER MINE.

Mine Office, Hellier.

Transportation, Big Sandy Division of the C. & O. Railroad.

Operated by the Edgewater Coal & Coke Co., Dr. George F. Honaker, President, Chicago; W. J. Woody, General Manager.

The company was engaged in construction work and driving entry, and no inspection was made.

GREENOUGH MINE.

Mine Office, Hellier.

Transportation, Big Sandy Division of the C. & O. Railroad.

Operated by the Greenough Coal & Coke Co., Edward Brewer, President, Shamokin, Pa.; William Plummer, Superintendent at mine. The mine is equipped with six, class L, Harrison pick machines, and six Whitcomb post-machines, one 150 h. p. Atlas tubular boiler, and one Norwalk compressor.

Inspected December 10th.—There were two open breakthroughs between the Second Left entry and air-course. All other conditions satisfactory.

HENRY CLAY MINE.

Mine Office, Lookout.

Transportation, Big Sandy Division of the C. & O. Railroad.

Operated by the Henry Clay Coal & Coke Co., E. P. Foust, President, 618 West Norwegian Street, Pottsville, Pa.; C. W. Evans, General Manager, Lookout. The mine (a drift) is ventilated by a furnace.

Inspected July 24th.—There were only nine persons employed underground, and all conditions were satisfactory.

Inspected December 10th.—Ventilation, drainage and timbering were satisfactory.

MARROWBONE MINE.

Mine Office, Lookout.

Transportation, Big Sandy Division of the C. & O. Railroad.

Operated by the Marrowbone Coal & Coke Co., J. J. McCracken, President, Masontown, Pa.; Frank Armour, Superintendent at mines. The first shipment was made from this mine in November.

Inspected December 10th.—Natural means were depended upon for ventilation. Written notice was served directing the company to sink an air shaft at once, and provide a fan or furnace of ample power to properly ventilate the mine.

PIKE COLLIERIES.

Mine Office, Matewan, W. Va. Tel. Office, Matewan, W. Va.

Transportation Norfolk & Western Railroad.

Operated by the Pike Collieries Co., R. M. McGuffin, President; H. D. Gast, Superintendent. The equipment consists of two Jeffrey generators, of 100 K. W. each. six '17A,' two '16A' mining machines, and one 10-ton Jeffrey electric locomotive.

Inspected March 27th.—Sufficient air was entering the mine and traveling the entries, but on account of the lack of check curtains on the entries the current did not travel the rooms.

Inspected July 19th.—There was cause for complaint at this time on account of the lack of check curtains to send the air into the rooms. Drainage and timbering satisfactory.

PIKE MINE.

Mine Office, Childers.

Transportation, Big Sandy Division of the C. & O. Railroad.

Operated by the Pike Coal & Coke Co., R. A. Hillier, President, 57 Equitable Building, Boston, Mass.; H. H. Chandler, Treasurer; Lowry Lewis, Secretary; George Beddo, General Superintendent, Pikeville, Ky. The mine is equipped with six, class L, Harrison pick machines, six Whitcomb post machines, one 150 h. p. Atlas tubular boiler, and one Norwalk compressor.

The mine was inspected twice in 1906, and found to be in good condition, in all respects, on each occasion.

VULCAN MINE.

Mine Office, Vulcan, W. Va. Telegraph Office, Vulcan, W. Va.

Transportation, Norfolk & Western Railroad; the coal being brought to the tippie at the railroad by aerial ropeway.

Operated by Vulcan Coal Co., W. C. Stephenson, President, Roanoke, Va.; A. D. Rice, Secretary and Treasurer; Roger Martin, Superintendent at mines.

Inspected March 26th.—The ventilation was very defective. The furnace power was totally inadequate to properly ventilate the mine, and no provision had been made to send the air into the rooms. Drainage and timbering satisfactory.

Inspected July 20th.—There was no improvement in the ventilation since the preceding inspection. Nothing has been done to increase the power at the air shaft. Written notice was served directing the company to at once remedy the evils complained of.

SOUTHEASTERN DISTRICT.

The following counties producing commercial coal lie within this district: Bell, Knox, Laurel, Pulaski, Rockcastle, and Whitley.

	1905	1906
Output of bituminous coal, in tons-----	2,777,253	2,992,676
Output of cannel, in tons-----	2,306	1,959
Production of coke, in tons-----	17,311	17,419
Employees-----	6,172	6,960
Average number of 10-hour days worked in 1906-----		174

Report of J. D. Cain.

In 1905 all inspections were made by Assistant A. G. Spillman. Mr. Spillman also made a few inspections in 1906, as indicated at the proper places, but practically all inspections for this year were made by Assistant J. D. Cain, who has charge of the district, and whose inspections began May 12th.

Bell County.

BELL JELICO MINE.

Mine Office, Bell Jellico. Freight and Tel. Office, Fourmile.

Transportation, L. & N. Railroad.

Operated by the Bell Jellico Coal Co., R. G. Yingling, President; A. C. Blowers, General Manager; M. G. Yingling, Superintendent.

[The last inspection in 1905 was made by A. G. Spillman on September 6th. The volume of air entering the mine was ample for the number of persons employed inside, but the current did not travel close enough to the faces. Drainage and timbering were satisfactory.]

Inspected July 26th.—The company was installing a shaker screen at the time of this inspection. The ventilation is with furnace. The mine being idle, the efficiency of the ventilation could not be determined. The mine is poorly timbered.

Inspected October 4th.—The volume of air entering the mine was ample, but it was allowed to travel the splits without being regulated. Better timbering was being done. The mine

is well drained. Mining is by shooting the coal on the solid. The coal is trammed to the outside with mules and then run over an incline down to the tipple.

BLANCHE MINES.

Mine Office, Blanche.

Telegraph Office, Pineville.

Transportation, L. & N. Railroad.

Operated by the Big Hill Coal Co., which began operations January 1, 1906. The mines are on Caney Fork of the Left Fork of Straight creek, five miles from Pineville. The officers are: H. P. Jones, President and General Manager; H. B. Hanger, Vice-president; J. A. Sullivan, Secretary, and Kuper Hood, Treasurer, with offices in the Union Trust Building, Cincinnati, Ohio.

Mr. W. E. Taylor, Chief Engineer, has furnished the following description of the company's operations, etc.:

"They have 900 acres of coal averaging 42 inches thick, with slate roof and bottom, no impurities and of the best quality. The coal makes a very good domestic coal as well as a high class gas and steam coal. While the mine has only been in operation a short time, "Peerless" coal has a standing second to none.

"Butt entries are driven 150 feet apart, with a 30-foot pillar between the heading and the air course. The rooms are 24 by 150 feet with a 10-foot rib, being worked on the angle of approximately 60 degrees, forty-foot centres on the entries, on account of the dip of the coal seam.

"The company has erected 80 three-room miners cottages, twenty four-room cottages, and one eighteen-room two-story boarding house, together with a large, frame commissary and office building. It is the intention to erect a brick structure for office and commissary purpose, to be 38 by 75 feet, to have all modern improvements, electric light, cold storage, elevator, furnace, etc., and to be located on a spur from the main track, for the handling of merchandise. A large barn has been built, to accommodate thirty head of stock, as well as storage for three cars of hay and two of grain.

"A blacksmith shop, and car repair shop, with drill press and electric power enables the company to repair cars and machinery quickly and cheaply.

"The tippie, built to accommodate two openings, one on either side of the ravine, is fifty feet high, framed with 10 by 10 and 12 by 12 timbers to suit the load. The South end of the tippie to No. 1 mine is double tracked, having a one per cent. grade in favor of the loads, over a Phillips cross-over dump, to kick-back, then $1\frac{1}{2}\%$ in favor of the empty cars which gravitate back to the pit mouth.

"The North end of the tippie is 400 feet long, with a 60-foot radius curve, one hundred feet from the dump, and has $1\frac{1}{2}\%$ grade in favor of both loads and empties, with a kick back dump, a third track being necessary on this side to handle the slate.

"The coal from both sides is dumped on the same $1\frac{1}{4}$ inch screen, from which the coal reaches a drop-bottom weigh-pan. After the coal is weighed, the weigh-pan can be dropped within eighteen inches of a shaker screen. Beneath the $1\frac{1}{4}$ inch screen hangs the $\frac{3}{4}$ inch screen. The screens are fitted with flaps to separate the dust, $1\frac{1}{4}$ -inch nut, and 2-inch nut, if necessary to its own place; the dust to a bin for steam purposes, the others each to its own car; or both can be loaded in either one car or the other. The 4-inch nut is separated by the shaker so as to be loaded on the third track, while the block coal is loaded on the fourth.

"Flaps and doors are so arranged that all coal that passes over the screens may be loaded on either the third or fourth track.

"The screens, built by the Duncan Foundry and Machine Co., of Alton, Ill., are driven by a belt from a line shaft from a 20 h. p. steam engine.

Two 200 h. p. Atlas tubular boilers, of the latest design, have been installed, together with necessary pumps and automatic injectors. The boilers are forty feet above the tippie and will be supplied by conveyors from bins above mentioned.

"Two 200 h. p. Atlas engines, direct connected to two 250 k. w., 270 volts, 660 ampere, Goodman generator, furnish the electric power. The coal is being cut by a Goodman low vein

machine and a 16A Jeffrey self-propelled machine, and is being hoisted by a 100 h. p. hoisting engine, with two motors and a ten-foot drum. This electric hoisting engine hoists coal from the No. 2 mine, twenty-five to thirty cars per trip.

"An eight-foot Thayer fan, connected to an 8 by 8 steam engine, furnishes ventilation for No. 2 mine, while a 6 by 10 furnace is adequate for the present needs of No. 1 mine.

"A Deming electric pump takes care of the water in No. 2 mine, while a syphon takes the water from a pump in No. 1, to which the water drains.

"There are four loading tracks, with a capacity of four cars above and below the tipple, with an empty and loaded storage track for twenty-two cars exclusive of above. At the upper end of the loaded storage track is a 100-ton Fairbanks-Morse R. R. scale.

"Five wells have been drilled in various parts of the camp to a depth of more than a hundred feet, each well being cased, cemented, and fitted with force pump, so as to insure a good supply of water and as a precaution against fire."

Inspected June 26.—The mine was in very good condition in all respects. The coal was dipping so rapidly that mining was done only on the high side of the entries. Ventilation was with fan. The coal was shot from the solid. Tramming was with mules to the tipple.

No. 1 Mine—Inspected October 19th.—Good conditions were maintained within the mine. Improvements had been made about the tipple, and No. 2 mine had been connected with the latter.

No. 2 Mine.—Inspected October 19th.—This mine had only been recently opened up and was but a few hundred feet in. It was temporarily ventilated with a furnace. Conditions satisfactory.

BLACK BEAR MINE.

Mine Office, Fourmile.

Transportation L. & N. Railroad.

Operated by Edward Blake, Lessee of the Black Bear Coal Company.

The last inspection in 1905 was made by A. G. Spillman, on August. [There were 37 persons employed in the mine

and the volume of air entering the underground works was ample for the number of persons employed inside, but it was not well conducted to the working places.]

Inspected May 12th.—The mine was idle the day of inspection. A new furnace was being built, which, however, was abandoned later on. The air was not being brought as close to the faces as required by law. The extreme dryness of this mine, together with the heavy charges of powder used in blasting the coal, should impress the management with the necessity for keeping this mine in good condition.

Inspected July 24th.—Some improvement could be noticed in ventilation, but the curtains were partly down on 3 Right. The mine was very dry.

Inspected October 5th.—The condition was generally unsatisfactory. It is evident that before this mine is in good condition a new furnace, or fan, must be installed, and proper returns made to it.

The coal is brought to the outside by mules and then run over an incline down to the tippie.

BLACK RAVEN MINE.

Mine Office, Fourmile.

Head Office, Chicago, Ills.

Transportation L. & N. Railroad.

Operated by the Black Raven Coal Co. M. Goldsmith, President, 63 Washington St., Chicago; S. Goldsmith, Secretary and Treasurer, Chicago; B. J. Nussbaum, Manager, Fourmile.

[The last inspection in 1905 was made August 1st. There were 74 persons employed underground, and a volume of 15,324 cubic feet of air was entering the mine, which was ample; but, on account of so many open break-throughs, the ventilating current did not travel within 60 feet or less of all working faces. The proper written notice, directing the company to remedy the evils complained of, was served.]

Inspected June 28th.—The ventilation was found unsatisfactory, due in a large measure to the smallness of the return airway near the fan.

Inspected December 7th.—Conditions were satisfactory in every respect.

The coal is mined with electric mining machines and hauled to the outside with motors.

COLEMAN MINE.

Mine Office, Cary.

Head Office, Louisville.

Transportation, L. & N. Railroad.

Operated by the Coleman Mining Co. Daniel Scanlon, President, Louisville; C. R. Coleman, General Manager, Cary.

This is a new operation and adjoins the Big Hill Coal Co. Coal was first shipped in September. The mine is ventilated with a 7-foot Thayer fan. Tipple is equipped with the Earlington shaker screen.

Inspected October 23rd.—The mine was found to be in a very satisfactory condition in all respects.

CLEAR FORK MINE.

Mine Office, Middlesboro.

Head Office, Middlesboro.

Transportation, Southern Railroad.

Operated by the Clear Fork Coal & Coke Co. J. D. Tempin, President; G. P. Morrison, General Manager; Peter Derr, Superintendent.

This company commenced shipping about July, and had a capacity of three to four hundred tons per day, at the date of inspection. The Southern Railroad reaches the mine by a branch road, leaving the main line near Habersham, Tenn., then running up Clear Fork some little distance into Kentucky. This mine is just over the State line in Kentucky.

Inspected October 18th.—The general condition of the mine was satisfactory. The coal is mined by pick work and is trammed by mules to the outside, then let over an incline down to the tipple.

COLUMBIA MINE.

Mine Office, Middlesboro.

Head Office, Middlesboro.

Operated by the Columbia Coal Co. E. R. Vowels, President; John Wells, General Manager.

This mine is located just above and to the right of the Wi-

nona Coal Co. The average thickness of the seam is nearly seven feet.

Inspected July 19th.—Ventilation was not under proper control. Timbering was of high class of workmanship.

Inspected October 17th.—Ventilation had been improved. Timbering excellent. Very little water had developed to date. The mining to date is hand work. The coal is trammed by mules to the knuckle, then dumped into monitors and run down an incline to tipple.

EAST JELICO NEW MINE.

Mine Office, Bell Jellico.

Head Office, Bell Jellico.

Freight and Telegraph Station, Fourmile.

Transportation, L. & N. Railroad. A spur leaving the main line near Fourmile, crossing the Cumberland river, and running up Greasy creek to where the mine is located.

Operated by the East-Jellico Coal Co. A. G. Corbett, President; S. Taylor Sheaffer, General Manager.

This is a new mine, the company having moved from Knox county, where it had been operating at Coalport. It was expected that shipments would be made from this mine by September or October, but on account of delays in building the railroad, which of course delayed the installation of machinery, etc., shipments could not be made until the last days of December, when a few car loads were sent out.

They have installed a splendidly equipped mining plant at this point, consisting of compressed air mining, electric motor haulage, and shaking screens. The coal now being mined is the Dean seam and is lowered down to the tipple over an incline.

The mine was visited in October, but at that time an inspection was not deemed necessary, as the entries were only a little way in.

FERN LAKE MINE.

Main Office, Middlesboro.

Operated by the Fern Lake Coal Co.

[When this mine was inspected on August 4th, 1905, there were 28 persons employed inside, but there was no ven-

tilation. The furnace was inadequate, and the drainage miserable. Twenty days were allowed this company in which to place the mine in a lawful condition. On September 4th, when another inspection was made, ventilation and drainage were satisfactory. Some cross timbers were needed on the 4th Left and 6th Left entries.]

EXCELSIOR MINE.

Mine Office, Excelsior.

Transportation, L. & N. Railroad.

Operated by the Excelsior Coal Mining Co. J. R. Miller, President; W. H. Bramblett, Vice President; A. I. Miller, Secretary and Treasurer; Clyde Miller, General Manager.

[When inspected August 5th, 1905, the mine was defective with respect to both ventilation and drainage. The furnace power was inadequate to properly ventilate the mine. Twenty days were allowed the company in which to make the necessary improvements. When inspected on September 5th, it was found that the drainage had been improved, and the ventilation and timbering were satisfactory.]

Inspection July 20th.—Ventilation very unsatisfactory. The haulways were very wet and muddy.

Inspected October 16th.—The mine was in as good condition as could be expected, operations now being principally robbing the mine out.

HIGHLAND RIM MINE.

Mine Office, Rim.

Head Office, Rim.

Freight and Telegraph Office Fourmile.

Transportation, L. & N. Railroad.

Operated by the Highland Rim Mining Co. W. T. Murrey, President, Chattanooga, Tenn.; W. M. Huff, General Manager, Fourmile.

This company is operating three separate openings, two in the Black Raven ("Pineville") seam and one in the large or Moss seam.

[The last inspections in 1905 were as follows: No. 1 (or Durell) Mine—Inspected August 2nd.—A volume of 24,350

cubic feet of air was entering the mine to supply the 38 persons, which was ample, but it was not properly conducted to the working places. Drainage and timbering satisfactory. No. 4 (or Moss Seam, formerly operated by the Four Mile Coal and Coke Co.) Mine.—Inspected August 2nd.—Sufficient air was entering the mine to supply the 36 persons employed underground, but it was not well conducted to the working places. Drainage satisfactory, and no neglect to proper timber was noticed.]

No. 1 Mine (Durrell)—Inspected June 28th.—The ventilation was not in satisfactory condition. Due diligence had not been exercised in seeing that the currents swept the interior of the working places.

No. 3 (or Three-Foot Seam) Mine.—Inspected June 28th.—Very little work was going on in this mine; an inspection was not deemed necessary.

No. 4 Mine (Moss Seam).—Inspected June 28th.—Conditions of this mine very good.

Inspected December 5th.—Great improvement could be noted in No. 1 mine, both as to ventilation and better timbering; better top having been encountered had improved the timbering feature. No. 3 mine was idle. No. 4 mine: In this mine care had not been taken to keep the main airway abreast of the main heading.

Compressed air mining was in vogue at both the mines. The coal is trammed to the tippie by mules at No. 1 mine. The same haulage is used at No. 4, but this mine uses an incline to reach the tippie.

LUKE & DRUMMOND MINE.

Mine Office, Logmont.

Head Office, Logmont.

Transportation L. & N. Railroad.

Operated by the Luke & Drummond Coal Co. George Luke, President; Hugh Drummond, General Manager.

[1905.—The last inspection in 1905 was made on August 3rd. The ventilation was defective. There was a fall of slate on the main return air-way and some rooms were driven almost 200 feet without break-throughs. Written notice was served directing the company to remedy the evils complained of.]

Inspected July 25th.—The mine was in an unsatisfactory condition in almost every respect.

Inspected October 19th.—Some little improvement could be noted.

ST. CLAIR (FORMERLY QUEENSBURY.)

Mine Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the St. Clair Coal Co. James St. Clair, General Manager. This company is successor to the Queensbury Coal and Coke Co., which opened and operated the mine in 1905.

[1905.—When inspected on August 4th, there were 31 persons employed inside, and there was not enough air entering the mine at the intake to turn the anemometer. The furnace power was inadequate, and the drainage was miserable. Twenty days were allowed the company in which to place the mine in a lawful condition. On September 4th the face of the 3d Right entry was found to be 20 feet too far ahead of the air, but all other conditions were satisfactory.]

Inspected July 20th, 1906.—Just previous to the date of inspection the mine had been idle. Some coal was being mined but the greater portion of the labor was cleaning up the mine, which was in poor condition.

Inspected October 16.—Mine idle on account of boiler giving out. Very little improvement could be noted. The top of this mine is very bad.

MOSS MINE.

Mine Office, Cary.

Head Office, Pineville.

Transportation, L. & N. Railroad.

Operated by the Straight Creek Coal Mining Co. M. J. Moss, President; E. N. Ingram, Vice President; Wm. Burchfield, Secretary and General Manager; E. S. Helburn, Treasurer.

The first coal from this mine was shipped in January, 1906.

Inspected June 26th.—Proper precautions had not been taken in cutting room break-throughs so the air could travel

the working places. There was a tendency to leave two or more crosscuts open, instead of closing up all but the last.

Inspected October 19th.—Conditions had become satisfactory. No machinery is used yet, in mining the coal. The tramming is done with mules to the outside then the mine cars are let down a short incline to the tippie.

SHAMROCK MINE.

Main Office, Middlesboro.

Head Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the Shamrock Coal & Coke Co. J. L. Manning, President; W. M. Costello, General Manager.

Inspected July 26th.—The mine was found to be in a fair and satisfactory condition. The trap doors of the mine are operated by the drivers and give splendid results over the old style of doors with trappers. The Card tippie is being used and is a great labor-saving contrivance for run-of-mine coal.

Inspected October 24th.—Good conditions had been maintained. The coal is mined by hand and trammed to the outside with mules. Monitors carry the coal down an incline to the railroad cars.

STRAIGHT CREEK MINES.

Mine Office, Straight Creek.

Head Office, Louisville.

Transportation, L. & N. Railroad.

Operated by the Straight Creek Coal & Coke Co. Theodore Harris, President; M. S. Barker, Vice President and General Manager; S. H. Stone, Secretary and Treasurer. This company is successor to the National Coal & Iron Co., the only change, however, being in the name.

[1905.—The last inspection of these mines in 1905 was made on July 29th. The No. 1 mine was found to be in a satisfactory condition in all respects. In the No. 2 mine conditions were satisfactory, with the following exceptions: A room face (Duff's) on the 7th North entry was 40 feet too far ahead of the air, and faces of rooms 43, 44, 45 and 47 on the 2d North were 65 feet too far beyond the air current. Explicit directions were given the company to make breakthroughs between rooms every 60 feet.]

Inspections in 1906 were as follows:

No. 1 Mine.—Inspected April 10th, by A. G. Spillman. Ventilation, drainage and timbering were all satisfactory.

Inspected November 26th, by J. D. Cain.—The run was over when the examination was made. Conditions were satisfactory. There are only a few months of work on entry stumps, and the mine will be finished.

No. 2 Mine.—Inspected April 10th by A. G. Spillman. The air entering the mine was not sufficient for the 84 persons employed underground, and what was entering did not reach the working places. The 8th North entry was very dry and dusty. Notice was served directing the company to keep said entry sprinkled with water in the future.

Inspected June 9th, by J. D. Cain.—The mine was now in excellent condition in all respects. Electric haulage was put in during the month of June. The plant consists of two 6-ton General Electric Company motors, one 250 k. w. General Electric dynamo, one 280 h. p. Buckeye engine, and two Sterling tubular boilers, each 325 h. p.

Inspected November 26th, by J. D. Cain.—The ventilation had again been allowed to fall below the legal requirements. In other respects the mine was satisfactory. The mining is all done by compressed air. Haulage is now entirely by electric motors.

No. 3 Mine.—This mine had been started, but had not developed any output with the closing of the year

STONY FORK MINES.

Mine and Head Office, Middlesboro.

Transportation L & N Railroad

Operated by the Stony Fork Coal Co. John Ralston, President; H. M. Ralston, General Manager.

[1905.—When examined in September, 1905, the volume of air entering the mine was ample for the number of persons employed inside, but on account of no break-throughs being made between the rooms the current did not travel within 60 feet or less of the working faces, as required by law. The drainage had not been improved since preceding inspec-

tion. The proper written notice was served directing the company to remedy the evil complained of.]

No. 4 Mine.—Inspected July 25th, 1906.—This is an opening on the left side of the creek and is opened up with due regard to conditions that are encountered in this seam. The Main airway, however, was not being timbered as it should be, to prevent future air-cutting of the slate and falls of top.

Inspected October 25.—Some falls had begun to be noted in Main airway return. The Company's attention was again called to the importance of keeping the airways well timbered.

First Left Mine—Inspected July 25.—Ventilation was very defective. Very little, if any, fire was found in the furnace.

Inspected October 25.—The entry needed ditching so water could drain. Ventilation had been improved in volume but a check curtain was needed to force the air through the rooms on the left side.

No. 2 Right Mine.—Inspected October 25.—A new furnace was ordered to be put in at this mine before any more persons were to be employed in this mine.

SAGAMORE MINE.

Mine Office, Logmont.

Head Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the Sagamore Coal Co., A. M. Chamberlain, General Manager.

[1905.—When inspected August 3, 1905, check curtains were needed on entries to send the air into the rooms; otherwise, conditions were good.]

Inspected, July 25, 1906.—The mine was in an unsatisfactory condition in almost every respect.

Inspected October 26.—The condition of the mine was such that it was necessary to serve the Company with a warning notice.

Inspected November 24.—New brattices had been placed as directed. Trap doors had been put on the entries at the proper places. An immense amount of timbering had been done, but more timbering and cribbing were needed to render the mine safe. More time was given the Company to do this work.

TURNER MINE.

Mine Office, Middlesboro.

Head Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the Turner Coal Co. Wm. Turner, President and General Manager.

[1905.—When inspected August 4th, natural means were depended on for ventilation, although thirty-seven persons were employed underground, and rooms in some instances driven 200 feet without break-throughs. Written notice was served on the company to at once provide a fan or furnace of ample power to properly ventilate the mine, and attention was called to the fact that the law required break-throughs to be made every sixty feet in rooms as well as entries. Twenty days were allowed the Company to place the mine in lawful condition. When again examined, on September 4th, the mine was idle but a shaft had been sunk and a furnace was in the course of construction. When these improvements are completed the ventilation will be improved. The drainage was defective. Timbering satisfactory.]

Inspected July 20, 1906.—Ventilation very bad. The mine is ventilated with a continuous current. The last crosscut between the 1st and 2d Lefts had been allowed to close, cutting off the entire current. The furnace was in bad condition.

Inspected October 15.—The plan of the mine had been changed to some extent and there were fair prospects of the mine being in better condition at an early date.

WINONA (OR BENNETT'S FORK) MINE.

Mine Office, Middlesboro.

Head Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the Winona Coal & Coke Co. J. L. Manring, President; P. L. Colgan, General Manager.

[1905.—When inspected August 4th, the mine was defective with respect to ventilation and drainage. The furnace power was inadequate to properly ventilate the mine. Twenty days was allowed the company in which to place the mine in a safe and healthful condition. When again inspected on September 4th, all conditions were found to be satisfactory.]

Inspected July 19.—The mine was fairly well timbered. The ventilation was not good. This was the result of poor brattice work.

Inspected October 17.—Very little improvement could be noted in the condition of the mine. Too little attention had been paid to closing airtight the crosscuts between the entries.

WALLSEND (OR PINEVILLE) MINES.

Mine Office, Wallsend.

Head Office, Wallsend.

Transportation, L. & N. Railroad

Operated by the Wallsend Coal & Coke Co., C. J. Warnock, President and Manager; H. B. Hanger, Vice President; H. P. Jones, Treasurer; J. A. Sullivan, Secretary; and W. E. Taylor, Chief Engineer.

[1905.—The last inspections of Mines No. 1 and No. 3 in 1905 were made on July 31st, and each mine was found in excellent condition.]

Inspections in 1906 were as follows:

No. 1 Mine.—Inspected by A. G. Spillman on April 11th. There were three open break-throughs on the 9th Left entry, and two on the 7th Left. The ventilating current did not travel within sixty feet or less of the working faces as required by law.

Inspected June 27th by J. D. Cain. The mine was in fairly good condition.

Inspected November 27th. Good conditions were being maintained.

No. 2 Mine.—This mine was inspected twice during the year. There was cause for complaint on each occasion, in that the air did not serve the working places. Except on the Main entry air-course, drainage was satisfactory. No lack of proper posting was observed.

No. 3 Mine.—When inspected June 27th, by J. D. Cain, ventilation was defective. Brattice work was in bad shape, and the small airways were more or less in need of cleaning out and made larger.

Inspected November 27th, by J. D. Cain.—No improvement had been made in regard to ventilation. The main entry needed scaling. The whole condition of the mine was such

that the company was served with a warning notice. Part of the mining is hand work, and part is done with electric machines. Haulage is by electric motors.

Mr. W. E. Taylor, chief engineer for the company, has furnished the following statement concerning the company's property, mine plant, etc.:

"The company owns nearly 1,500 acres in fee, all of which is underlaid with at least three seams of coal of workable thickness, while most of it carries six seams of workable coal. Only two of these seams have been worked. The Pineville or 'Brilliant' seam is worked by two drift openings, one on either side of Stewarts Branch, opening on the same tippie. This seam is from thirty inches to forty-eight inches thick, with an average of thirty-seven inches. It lies nearly level and has a good top and bottom.

"This coal has the reputation of being the best gas coal in the State, a long series of tests having shown more gas, of a higher candle power, than can be obtained from any other coal in the State of Kentucky.*

"An average analysis shows the following percentages:

"Sulphur 0.62, carbon 62.50, volatile 34.40, and moisture 3.10. This is a natural coking coal, and gas houses find their by-products very valuable. For steam and domestic purposes it ranks with the very best.

"The property is on the C. V. division of the L. & N. Railroad, at the junction of Straight creek and the Cumberland river, having access to both. There yet remain about 1,200 acres of the Pineville seam to be worked. The No. 2 mine is about 710 feet above the level of No. 1 and No. 3 mines. This mine is reached by a double track incline, 2,300 feet in length. This seam is about four feet thick and carries a cannel seam from eight to twenty-four inches thick.

"The company is preparing to open a seam about 230 feet above the 'Brilliant' seam and expect during the summer of 1907 to shaft for one of the lower seams which lie about two hundred and fifty feet below water level. Tests have shown this coal to be eight feet in thickness.

*The great excellence of the Pineville seam, which is worked at a number of points in Bell county, is beyond question, but the terms in which Mr. Taylor speaks of it are his own. A thorough, systematic examination of all the coals of the State, or of even the larger number of them, has not been made.—C. J. N.

"There are for miners 119 three-room cottages, 17 single or 'baching houses,' and one twenty-room boarding house; also houses for Superintendent and Foreman. The store and office building is a two story brick structure, 56 by 64 feet, and has all modern improvements, such as electric lights, cold storage hot and cold water, etc. A large barn has accommodations for twenty-five head of stock. Other buildings, consisting of blacksmith shop, three fan houses, boiler house, power house, are all well built and equipped.

"The mines are well ventilated by three eight-foot Thayer fans, all driven by 8 by 8 steam engines. Steam is furnished by two 80 horse power and one 100 horse power tubular boilers, equipped with both injectors and feed pump. Electric power is furnished by one 200 horse power and one 150 horse power McEwan engine, belted to one 160 k. w. and one 135 k. w. Goodman generators. Voltage carried is 250.

"The No. 1 and No. 3 openings are about twenty-five feet below the tippie floor, and the coal is hoisted by two 25 horse power double hoisting engines, with double drums and double detachable clutches. The machine shop is equipped with a 5 h. p. motor, belted to line shafting, which furnishes power for one 20-foot engine lathe with full equipment of tools, one 20-inch pillar drill press, self-feeding and swinging table, also emery and sandstone grinding wheels, etc. The shop is well equipped for renewing and repairing all electrical machinery.

"In No. 1 mine the coal is gathered to the main heading by mule power and is delivered from the landings to the bottom of the slope by an 8-ton Goodman motor. In No. 3 mine no mules are used, the coal being gathered and delivered to the bottom of the slope by three 4-ton Goodman motors.

"In the mining of coal electric chain machines are used, consisting of three Jeffrey, one Morgan-Gardner, and one Goodman breast machines and one Goodman long wall machine.

"There are fifty beehive coke ovens located near the tippie. The coal for coking purposes is crushed by a 44-inch Steadman disintegrator. The coke ovens have not been in operation during 1906, as it was found more profitable to sell the coal than to coke it."

Knox County.

(Inspections and report for 1906 by J. D. Cain, Assistant Inspector.)

ARTEMUS JELICO MINE.

P. O., Artemus.

Transportation, L. & N. Railroad.

Operated by the Artemus Jellico Coal Co., Geo. Huettel, President and General Manager; T. J. Baker, Vice-president; M. V. Wells, Secretary.

[1905.—Last inspection for this year, July 7th.—The ventilation was defective, since the air did not travel within the legal distance from the working faces—due to poor condition of curtains.]

Inspected August 4th, 1906.—While the drainage and timbering was good, the ventilation was poor. The furnace door was in bad shape and a general leakage of air was noted.

Inspected December 13th.—The mine was idle on account of lack of cars. The mine foreman could not be found. Nothing was determined as to ventilation, except that brattices had been improved.

BARBOURVILLE BLUE GEM MINE.

Mine Office, Barbourville.

Transportation, L. & N. Railroad.

Operated by the Cottengem & White Coal Co. Part of the year this mine was operated by J. H. Cottengem Coal Co. It has been difficult to keep track of the changes in operators. In 1905 Hammons & Cottengem ran the mine. On July 29th of that year it was being connected with the old Knox Gem.

Inspected April 12, 1906, by A. G. S.—The air current was too weak to be measured by anemometer; even had there been an ample current, no provisions had been made for sending the air to the men in the working places.

Inspected July 28th, by J. D. C.—The drainage at this time was simply wretched. The mine being idle on this day, nothing was determined as to ventilation.

Inspected December 14th.—On the date of this inspection the company was reorganizing with a view of carrying on the mining with some system. Ventilation was unsatisfactory.

The drainage will be better when the new main entry taps the old works. A fan should then be installed at the old main opening.

BAILEY BLUE GEM MINE.

P. O., Bailey's Switch.

Transportation, L. & N. Railroad.

Operated by the Bailey Coal Co., J. R. Bailey, Owner.

This mine is located about two miles north of Barbourville and has only a modest output. The mining is by compressed air. The coal is hauled to the tippie with mules.

Inspected December 18th, 1906.—The furnace has ample power to ventilate the mine, but the brattices and curtains were in need of repairing.

BENNETT BLUE GEM MINE.

P. O., Barbourville.

Transportation, L. & N. Railroad.

Operated by the Bennett Blue Gem Coal Co., Samuel Bennett, President; Bart Rogers, General Manager.

Inspected December 13th, 1906.—This mine has a good furnace, but the day of the inspection no fire was in it. The ventilation was very bad, and on the Main entry the drainage was so bad that arrangements were made for the mine to have a new Main entry that could be drained. This mine, in common with many Blue Gem mines, is only worked part of the year, and some visits of the Inspectors find them idle; other visits will find the mines with fewer persons employed than the number that brings them under the law. The day of this inspection 15 persons were found within the mine.

BENNETT-JELICO MINE.

P. O., Trosper.

Transportation, Cumberland Railroad to the L. & N.

Operated by the Bennett Jellico Coal Co., Samuel Bennett, President; Philip Francis, General Manager.

Inspected August 3d.—This mine, which was opened in 1906, was in satisfactory condition. The plan of the workings

is an abridged system of retreating long wall. At the time of this inspection the work had not progressed much beyond the necessary narrow work to place the system in use. The mining is by compressed air. Mule haulage.

Inspected December 12th.—So far the retreating longwall system is proving a success, the top not giving the trouble on the come-back that is met with in driving the narrow work. This system of work is recommended especially where the top is too tender to permit room and pillar work. Conditions had been well maintained.

BENNETT MINE.

P. O., Trosper.

Transportation, Cumberland Railroad to the L. & N.

Operated by the Bennett Coal Co., Samuel Bennett, President and General Manager; Thomas Bennett, Superintendent.

This mine is located on the right of the Cumberland road, about six miles from Artemus. Coal was first shipped in October, 1906. The mining is with compressed air. Mule haulage to the outside. The coal is run down an incline in the mine cars to the tippie. The seam now being worked is the Dean, averaging 5 feet in thickness.

Inspected December 10th.—The mine was idle the day of inspection, but the ventilation, which is by furnace, was found to be good.

CUMBERLAND MINES.

P. O., Warren.

Transportation, Cumberland Railroad to L. & N. Railroad.

Operated by the Cumberland Coal Co., W. M. Warren, President, Warren, Pa.; F. F. Whittiken, General Manager.

This is a new operation on Bushy Creek, which, although developed in 1905, did not commence shipping until June, 1906. The mines are located about 10 miles from Artemus. For the present, the mining is by hand work. Mule haulage to the outside, then with steam motor to the top of incline.

Inspected August 3d.—The mines were in excellent condition in all respects.

Inspected December 11th.—Good conditions were being maintained.

COALPORT COAL CO.'S MINE.

P. O., Coalport.

Transportation, L. & N. Railroad.

Operated by the Coalport Coal Co., A. C. Blowers, President and General Manager.

The mine was opened the first part of 1906, and is located just to the right of the old mines of the East Jellico Coal Co. The first half of the year the mine was operated by Black & Shaeffer. It was then sold to the present owners.

Inspected August 4th.—The mine was in very good condition in all respects.

Inspected December 12th.—Conditions had been well maintained.

EAST JELICO MINE.

The East Jellico Coal Co. operated its mine at Coalport only up to May 1st, 1906, having moved its plant to the company's new mines in Bell county. Fairly good conditions were maintained in the mine during 1905.

GRAY JELICO MINE.

P. O., Grays.

Transportation, L. & N. Railroad.

Operated by J. Tilden Gray.

Inspected August 10th, 1906.—The mine was in very bad shape as to ventilation.

Inspected December 17th.—The mine was found to be fairly well aired. It will be necessary to make some changes in the manner of ventilating this mine when the new lease is being worked.

HUGHES JELICO MINE.

P. O., Hujel.

R. R. Sta., Flat Lick.

Transportation, L. & N. Railroad.

[1905.—Last Inspection, July 8th.—The volume of air entering the mine was not ample for the number of persons employed underground, and even then, on account of the poor condition of the curtains, the current was not well conducted to the working places.]

Operated by the Hughes-Jellico Coal Co., W. R. Hughes, President and General Manager. During the year 1906 the plan of letting the mine cars down the incline to the tippie was changed to monitors. The mining is by hand work; mule haulage to the outside.

Inspected June 8th, 1906.—The mine was found in good condition.

Inspected December 7.—Satisfactory conditions were being maintained.

INGLES MINE.

P. O., Hujel.

Transportation, L. & N. Railroad.

Operated by the Ingles Coal Co., J. L. Ingles, President, Radford, Va.; H. Ingles, Vice-president and General Manager.

This new mine is located at Ely, on the right of the Ely creek spur track. The seam opened is at about the same level as the Hughes Jellico. The mining is by hand work. Haulage is with mules to the outside. Monitors are used to lower the coal to the tippie.

Inspected June 8th, 1906.—Ventilation was not being well conducted, some of the entries was too far ahead of cross cuts. Break-throughs in rooms were not being always made as soon as they should be. A new furnace was needed.

Inspected December 6th.—All conditions were now satisfactory.

LYNN CAMP MINES.

P. O., Grays.

Transportation, L. & N. Railroad.

Operated by the Lynn Camp Coal Co., L. H. Hedrick, President, Richmond, Ky.; S. F. Rock, General Manager.

This is a new operation (2 mines), one mile east of Rossland, on Lynn Camp creek. Some coal was shipped in December, 1906. The present operations consist of two openings, one in the North Jellico seam and the other in one some sixty feet above. The upper seam is probably the same that is found at that distance above the Jellico in other portions of this territory, but there is considerably more thickness in this property. So far the mining is hand work and mule haulage to the tippie.

Inspected December 19th, 1906.—Both the openings were in satisfactory condition.

MATHEWS MINE.

P. O., Hujel.

Head Office, Barbourville.

Transportation, L. & N. Railroad.

Operated by the Mathews-Jellico Coal Co., John J. Mathews, President and General Manager.

This is a new operation, the third and upper on Ely Creek. Mining is hand. Haulage by mules to the outside, then the mine cars are run down an incline to the tippie.

Inspected July 27th, 1906.—The mine was well timbered and drained, but not enough attention was being paid to the ventilation.

Inspected December 7th.—Poor brattices were still in evidence rendering the current deficient in some of the working places.

NORTH JELlico COAL Co's MINES.

General Manager's Office, Wilton.

Head Office, Louisville.

Transportation, L. & N. Railroad.

Operated by the North Jellico Coal Co., J. B. Speed, President; F. M. Sackett, Vice-president; W. A. Jones, Secretary and Treasurer; C. S. Nield, General Manager.

Bertha Mines.—P. O., Bertha. Alex Frost, Superintendent. When inspected by A. G. Spillman on July 4th, 1905, all conditions were found to be satisfactory. When inspected by J. D. C. on August 15th, 1906, the ventilation had only moderately been maintained at the extreme points of the working places.

Wilton Mine.—When inspected July 6th, 1905, by A. G. Spillman, all conditions were found satisfactory. When inspected August 14th, 1906, by J. D. C., ventilation had not been well maintained. The rights were nearly worked out and little attention seemed to be paid toward keeping the brattices in good repair in this side of the mine. The lefts were fairly ventilated.

Olive Hill Mine.—This mine was opened in 1905, but did not reach a considerable output that year. When inspected on August 14th, 1906, by J. D. C., conditions were found to be

excellent. The added duty of enforcing the miners' oil law prevented the Inspector from making a second visit to the mine.

Cannel Ridge Mine.—This is a new operation that was being developed in 1906. The coal mined here is hauled to the Bertha tippie with motors. When inspected on August 14th, the six separate openings had only been started a short while. Conditions excellent.

The North Jellico Coal Co. uses electric motors at all the mines except the Olive Hill, the coal from which is, as yet, being hauled to the tippie by mules. The mining is mostly with compressed air, the balance electric. Two power plants are installed, one at Bertha, and the other at Wilton. Both mining plants are equipped with the latest of modern mining machinery.

NORTH POINT MINE (HANOVER.)

P. O., Gray.

Transportation, L. & N. Railroad.

Operated by Mrs. S. M. Gray.

[1905.—When last inspected this year, on July 5th, the current was not well conducted to the working places, though there was ample entering the mine. The Main entry was too wet and muddy.]

Inspected August 10th, 1906.—Proper ventilation was not being maintained.

Inspected December 19th.—The mine was idle on this day, but it was noted that all instructions of the Inspector that were given at the previous visit had been put into effect.

ROSSLAND MINES.

P. O. and Tel. Office, Gray.

Head Office, Middlesboro.

Transportation, L. & N. Railroad.

Operated by the Rossland Coal Co.; John Howard, President; W. G. Chelf, Vice-president and General Manager.

These mines were formerly operated by the Ross Jellico Coal Co. They had practically been at a standstill the last half of 1905 and up to May 12th, 1906, when the present company took charge.

In the Old Mine work was practically confined to pillars and stumps as far back as July 5th, 1905, when it was visited by A. G. S. When inspected by J. D. C. on August 10th, 1906, work was still on pillars and stumps, but it was evident that it would soon be completed. Conditions were fairly good. When visited on December 19th, the tibble had been moved to the New, or No. 2 mine, and very little work was going on in the old one.

The New, or No. 2 Mine was inspected December 19th. This mine is the first one on the Lynn Camp spur, and therefore on the opposite side of the railroad from the old mine. Some considerable development has been done, but no coal had been shipped up to the date of inspection. Conditions within the mine were good.

Laurel County.

(Inspections and report for 1906 by J. D. Cain, Assistant Inspector.)

CURVIN MINES.

P. O. Viva.

Transportation L. & N. Railroad.

Operated by G. W. Curvin.

[1905.—Last inspection August 7th. All conditions were satisfactory.]

Inspected July 13th, 1906.—These mines consist at the present time of two openings that as yet are not connected. Both are ventilated with furnaces. The right opening was in very good condition. The Main was being cleaned up. Only five persons were employed in this mine. Conditions bad.

Inspected October 1st.—Only the main mine was inspected at this visit. The furnace was furnishing ample air, but current was not being well conducted, the working places being without proper ventilation.

JEFFREY MINE.

[This mine, near East Bernstadt, to judge by monthly reports sent to this office, has had a varied experience as to name. It was operated by J. L. Wells during January and February 1905. On March 1st, 1905, it was bought by Mrs. J. C. Pritch-

ard, of East Bernstadt, and was known as the "Jeffrey" until September following. On September 1st the name became "Kentucky;" then back to "Jeffrey" on November 1st; and finally "Kentucky" again in report of June 1906. The mine was an inconsiderable one and did not run after January, 1906, the report being that it had worked out. It was not found in satisfactory condition when operating in 1905.—C. J. N.]

LAUREL RIVER MINE.

[The Laurel River Coal Co. operated a mine near Lily for about six months in 1905. Mr. Kenneth U. Meguire, Secretary and Treasurer of the Company, has furnished the following statement: "Our company began operations of a lease of 500 acres of land, owned by L. L. Park, of Lily, on June 1st, 1905. Work was continued until December 1, 1905, when we were forced to abandon said property owing to a continuance of bad conditions."—C. J. N.]

LILY MINES.

Mine Office, Lily.

Transportation, L. & N. Railroad.

Operated by the Lily Jellico Coal Co. O. W. Black, President and Treasurer; F. J. Black, Secretary and Manager; O. H. Black, Vice President and Superintendent.

These mines were reopened in 1904 and began shipping in January 1905.

[1905.—When first inspected, June 3rd, 1905, ventilation and drainage were very bad. At the time of the third and last inspection for this year, namely, September 7th, ventilation was satisfactory and drainage had been much improved. Some heavy cross-timbers were needed where a fall had occurred.]

Inspected July 12th, 1906.—At the time of this visit the operations were confined to the old No. 1 mine. The mine was in bad condition; not enough air was reaching the working places and the mine was very wet. Timbering had been neglected on the haulways; falls partly blocked the air ways.

Inspected December 20th.—No. 1 mine had been abandoned and what little development was going on was confined to a

new opening that was called No. 7 and consisted of only a small amount of crop coal. Ventilation was poor and a lack of timbering was again in evidence.

NELSON MINE.

P. O. Altamont.

Transportation, L. & N. Railroad.

This is a new mine which was opened by the Phenix Jellico Coal Co. It is now operated by W. Grant, Lessee.

Inspected July 16th.—The mine was defective in all respects.

Inspected August 6th.—Some improvement had been made in drainage. The ventilation was still bad. Twenty days extension was granted.

Inspected September 10th.—A mistake had been made in locating the new airshaft. Ten days stay of prosecution given.

Inspected October 1st.—Conditions now good.

NEW ALTAMONT (FLAT TOP) MINE.

P. O. East Bernstadt.

Transportation, L. & N. Railroad.

The mine is at Altamont. It was operated by John L. Wells, under a five years' lease, from June 1905 to September 1906. For the remainder of 1906 it was operated by Messrs. Almy and Pritchard.

[1905.—Last inspection for the year was on August 8th. There were 52 persons employed inside. A current of air entering the mine strong enough to turn the anemometer could not be found. At no place in the bank could reading be got except at the furnace. The proper written notice directing the company to remedy the evils complained of was served.]

Inspected July 16th, 1906.—All conditions were being well maintained.

NEW LAUREL MINE.

Mining Office, Pittsburg.

Transportation, L. & N. Railroad.

Operated by the New Laurel Coal Co. W. A. Pugh, President; J. W. Bastin, General Manager.

[1905.—On August 9th, ventilation and timbering were good, but drainage bad. On December 20th, the mine was inspected in respect to ventilation and drainage. The mine curtains were old, leaky, and of little value.]

All inspections in 1906 were by J. D. Cain, as follows:

The natural conditions encountered in operating this mine have been against keeping the mine in good condition; especially is this true in regard to the water found in the roof and the tendency of the top to cut in the entries.

Inspected July 12th.—The mine was very wet and some loose slate was noted in the entries, which, however, was being taken down. The ventilation was not entirely satisfactory.

Inspected August 17th.—Ventilation was defective towards the head of the Fagan and Lunsford entries. The mine was still very wet on the haulways.

NEW DIAMOND (PHENIX JELICO).

P. O., East Bernstadt or Altamont.

Transportation, L. & N. Railroad.

Operated by the Phenix Jellico Coal Co. W. R. Ballou. President and General Manager; J. H. Tinsley, Secretary.

The company acquired the New Diamond Mines by lease on May 15th, 1905, and subsequently bought the Standard mines (which see), and opened the Nelson mine (which see).

Electric haulage was put in during 1905, the use thereof beginning November 15th, on which date all mules, except three on the "new side," were taken out. The haulage plant consists of the following: One 225 h. p. McEwan engine, one 150 k. w. Goodman generator, one 10-ton Goodman motor, and two 5-ton Goodman motors. These were installed in August, 1905. Both air and electric coal cutting machines are used.

[1905.—When last inspected in 1905, i. e., August 7th, the mine was found in a satisfactory condition.]

The company classes its operations here as No. 1 and No. 2.

Inspected No. 1 mine July 16th, by J. D. C.—All conditions were found satisfactory.

No. 2 mine was inspected July 16th.—The ventilation was barely sufficient for the 22 persons employed.

NEW STAR MINE.

Mine Office, East Bernstadt.

Transportation, L. & N. Railroad.

Operated by the New Star Coal Co. Jonathan McNiel, President; Samuel Bastin, General Manager.

Inspected July 13th, 1906.—The ventilation was far from satisfactory. Ample air was entering the mine, but to a great extent little regard was paid to seeing that the current swept the interior faces of the working places.

O. K. JELICO COAL CO.

The O. K. Jellico Coal Co. operated (near Lily) only in 1905, and then for a short time only. The mine was closed down May 1st, and the company went out of business.

OLD PITMAN MINE.

P. O., Pittsburg.

Transportation, L. & N. Railroad.

Operated by William Dunavent.

This is one of the old Pitman mines, on the West side of the railroad, reopened in 1906. Something like a year's work is expected to be recovered.

Inspected July 9th.—A furnace had been built and all mining requirements were being given to the operations. Conditions very good.

PITMAN MINE.

Mine Office, Pittsburg.

Transportation, L. & N. Railroad.

Operated by the Pitman Coal Co. W. A. Pugh, President; J. L. Caldwell, General Manager.

[1905.—When inspected August 10th, the volume of air entering the mine was ample for the 59 persons employed inside, but on account of the leaky condition of the curtains on the room necks, it did not travel the working places as it should have done. The drainage was bad. When inspected December 20th, the mine was defective with respect to ventilation and

drainage. The volume of air entering the mine was not ample, and what there was did not travel within 60 feet or less of the working faces as required by law. The curtains on the room necks were old and leaky. The proper written notice directing the company to remedy the evils complained of was served.]

Inspected July 11th, 1906.—Drainage has been bad. The lefts are not well ventilated.

PITTSBURG MINE.

Mine Office, Pittsburgh.

Transportation, L. & N. Railroad.

Operated by the Pittsburgh Coal Co. R. M. Jackson, President and General Manager; William Woods, Secretary; Fred Woods, Mine Superintendent.

[1905.—When inspected August 9th all conditions were satisfactory except on the 3rd Left entry, where ventilation and drainage were defective. On December 19th, the date of the last inspection for the year, the face of the 3d Right entry was 125 feet ahead of the air, and the face of the Main South entry was 129 feet ahead of the air. The road on the West Main, from the 1st West to the door, was too wet and muddy. All other conditions satisfactory.]

Inspected July 10th, 1906.—The condition of this mine was satisfactory except that the main airway had become more or less filled with the slate falls. These were promptly cleaned out on request of the Inspector.

ROCKWELL MINE.

P. O., Pittsburgh.

Transportation, L. & N. Railroad.

Operated in 1906 by S. W. Rockwell, owner. This is a wagon mine between Pittsburgh and London. The average number of persons employed does not exceed eight. Part of the output is hauled to a nearby switch, the rest is sold locally.

Inspected July 30th, 1906.—The ventilation was natural although the mine has a furnace. The main entry was very muddy and in one place nigh impassible on account of water.

STANDARD MINE (PHENIX JELICO.)

P. O., Viva.

Transportation, L. & N. Railroad.

Operated by the Phenix Jellico Coal Co., which bought it from the Standard Coal Co. in 1905. The latter company operated the mine until November 15th, 1905. Officials of the Phenix Jellico Coal Co. are: W. R. Ballou, President and General Manager; T. C. Ballou, Vice President; J. H. Tinsley, Secretary and Treasurer. The company's mines include the New Diamond and Nelson, (which see), and the Standard as distinct operations, and the Manchester and Blakely, which are handled with the others.

[1905.—Last inspection August 7th. The air-way to the fan had fallen in, and there was practically no ventilation in the working places of the mine. Written notice was served on the company directing that the fan be moved from its present position. There was too much mud and water on the roads.]

Inspected April 21st, 1906, by A. G. S.—The mine was ventilated by a furnace, but the latter's power was insufficient to meet the demands on it, and ventilation was defective.

Inspected subsequently by J. D. C.—Conditions satisfactory. Very little development has been done at this mine the present year.

Pulaski County.

(Inspections and report for 1906 by J. D. Cain, Assistant Inspector.)

ALPINE MINES.

Mine Office, Alpine.

Main Office, Chattanooga, Tenn.

Transportation, Cincinnati Southern Railway.

Operated by the Alpine Coal Co. J. T. Hill, General Manager and Treasurer. The latter part of the year the mine was operated by O. L. Hurlbert, Receiver.

[1905.—Last inspection for this year was June 23rd. The mine was defective with respect to ventilation, in that the air does not travel within 60 feet or less of the working places as required by law. Drainage was bad on the Third Right and Fifth Left entries.]

Inspected in 1906 as follows: May 9th, by A. G. S.—Volume of air entering the mine was ample, but on account of leaky curtains it did not reach the working places.

June 19th, by J. D. C.—The mine showed an improved condition in regard to ventilation and drainage.

September 21st, by J. D. C.—Enough air was not being sent to the working places. The drainage on the main entry was bad.

BARREN FORK MINES.

P. O., Barren Fork.

R. R. Station, Flat Rock.

Transportation, C. S. Railway.

Operated by the Eagle Coal Co. W. L. Carter, General Manager.

[1905.—The No. 7 mine when last inspected this year was in satisfactory condition. During the year a 14-foot Cole fan was installed.]

Inspected June 15th, 1906, by J. D. C.—All mining conditions were being properly observed.

Inspected September 20th.—The persons that were pulling the stumps in new No. 7 were not setting sufficient timbers to insure safety. In No. 6 mine, on First Left, the last two curtains were down. Elsewhere the mines were in good condition.

COGAR CREEK MINES.

P. O., Flat Rock.

Transportation, Cincinnati Southern Railway.

Operated by Peters & Souleyret.

[1905.—Last inspection for the year June 21st. The volume of air entering the mine was ample for the 27 persons employed underground, but it was not well conducted to the working places. Written notice was served on the company calling attention to the fact that the furnace was inadequate to properly ventilate the mine, and directing that it be enlarged. The drainage was bad on the Main entry.]

Inspected June 14th, 1906.—The mine had been recently overhauled and was in fair condition in all respects.

When visited on September 20th the general condition of the mine had been allowed to drop to a low standard.

INDIAN HEAD MINE.

P. O., McGuffey.

Transportation, Cincinnati Southern Railway.

Operated by the Indian Head Coal Co. C. T. Cory, President; S. E. Rich, Secretary and Treasurer; H. L. Cory, General Manager.

[1905.—Last inspection for the year, June 22nd. The ventilation and drainage were defective.]

Inspected June 14th, 1906.—The mine was very defective, so much so that a warning notice was given the Company.

On July 7th the mine was again visited but was found idle, on account of repairs that were being made. A new furnace was being installed.

On August 8th the conditions were very much improved, but the furnace stack was not high enough.

NEW CUMBERLAND MINE.

P. O., McGuffey.

Express Office, Cumberland Falls.

Transportation, C. S. Railway.

Operated by the New Cumberland Coal Co. H. B. Lindsay, President and Manager, Knoxville, Tenn.; Chas. H. Smith, Vice President; Robt. S. Young, Secretary and Treasurer; J. M. McGuffey, Superintendent.

[1905.—Last inspection June 22nd. The mine was idle, consequently the quantity of air entering the mine and flowing through it could not be accurately determined. With the furnace fired, all indications were that the ventilation would be satisfactory. Timbering and drainage satisfactory.]

For 1906 inspections were as follows: May 9th, by A. G. S.—Ventilation and drainage were very defective. The furnace was in bad condition and the entry roads were very wet and muddy.

On the same date the bank leased by John Sears was examined. The air-course for Main entry was partially filled with water, and choked by falls of slate. The furnace power was inadequate. The mine simply had no ventilation.

Inspected June 13th, by J. D. C.—This mine had been inspected the month previous and a warning notice served but

very little had been done towards obeying the Inspector's instructions. However, the dangerous slate on the main entry had been taken down. An extension of twenty days was given.

The mine was again visited by J. D. Cain on July 7th. The mine that day was idle. It was however ascertained that instructions of June 13th, as well as those of May 9th, had been ignored. The matter was placed in the hands of the Commonwealth Attorney, and indictment procured, and judgment obtained against the company.

On September 22nd the mine was again inspected. While some little improvement could be noted in the volume of air, it was defective in amount and will be until the alterations the Inspectors have ordered are made. The drainage on Main entry was very bad, and simply wretched on the 5th Left.

PARIS MINE.

P. O., Parkerslake.

Transportation, C. S. Railway.

In 1905 the mine was operated by the Mahoning Coal Co., successors to the Paris Coal Co., the officers of which were D. A. Davidson, President; Jno. G. Erskine, Secretary and Treasurer, and J. K. Mitchell, Superintendent. Later, in 1906, operations have been carried on by P. P. Walker, Lessee of the Mahoning Coal Co.

[1905.—Last Inspections, June 21st. The mine had been very much improved since the preceding inspection, but its condition still was not satisfactory. Strong assurances were given by the Company that improvements would be continued until the entire mine was placed in a safe and wholesome condition.]

Inspected June 12th, 1906, by J. D. C.—The good condition of the mine was being well maintained. Shortly after this visit the mine became idle and so lay for several months, hence no other inspection was made during the year.

Rockcastle County.

(Inspections and report for 1906 by J. D. Cain, Assistant Inspector.)

BIG HILL MINES.

The mines at Johnetta, which were operated by the Big Hill Coal Co. in 1905, were dismantled in 1906, the company transferring its operations to Bell county. On December 22nd, 1905, when these mines were last visited, all operations were confined to drawing stumps. Conditions were as good as could be expected.

NEW LIVINGSTON MINE.

Mine Office, Livingston.

Transportation, L. & N. Railroad.

Operated by the New Livingston Coal Co. W. R. Cook, President; J. T. Johnson, Vice President; W. McC. Johnson, General Manager; R. E. McRoberts, Treasurer.

This is a new operation, up the river, near Livingston. The mine was opened in 1905. The coal is mined by electricity, hauled to the outside by mules, then sent by incline across the river on a swinging bridge, thence carried to the tippie by electric motor. Later the inside haulage was changed to motors.

1905.—[When inspected on August 10th, ventilation was defective, the furnace power being insufficient to properly ventilate the mine. Timbering and drainage were satisfactory.]

Inspections for 1906 were as follows:

Inspected June 21st.—At the time of this inspection the fan had not yet arrived and the ventilation was very bad.

Inspected September 25th.—The electric fan was installed and ample air was traveling the working places. Other conditions good.

Whitley County.

(Inspections and report for 1906 by J. D. Cain, Assistant Inspector.)

BURK HOLLOW MINES.

P. O., Jellico, Tenn.

Transportation, L. & N. Railroad.

Operated by the Burk Hollow Coal Co.

[1905.—The last inspection was made July 26th, at which date the mine was in good condition.]

Inspected August 22d, 1906.—In the Blue Gem mine the entries are driven through the hill and only crop work was going on. The mine was in a wholesome condition. In the Jellico seam, above, only seven persons are employed. Ventilation was being maintained sufficient for this number.

CAMPBELL MINES.

P. O., Wofford.

Main Office, Knoxville.

Transportation, L. & N. Railroad.

Operated by the Campbell Mining Co. R. O. Campbell, President, Atlanta, Ga.; Jas. Carmack, Superintendent. This company succeeded Hoffman & Berry, January 1st, 1906.

[1905.—When last inspected in 1905, namely, on July 27th, all conditions were satisfactory.]

Inspected August 16th. The mining is by compressed air, mule haulage to the outside then the mine cars are run over two separate inclines to the tippie. All conditions were found satisfactory except the First Left which was both wet and deficient in ventilation.

COOKE (FORMERLY MOORE'S) JELICO.

P. O., Jellico, Tenn., R. F. D., No. 1.

Transportation, L. & N. Railroad.

Operated by the Cooke Jellico Coal Co. E. S. Helburn, President; W. E. Cooke, Vice President; L. S. Helburn, Secretary. The Cooke Jellico Coal Co. was organized April 1st, 1905, and succeeded the Moore's Jellico Coal Co.

[1905.—When last inspected in 1905, i. e., July 25th, ventilation and drainage were very defective. The furnace power was inadequate.]

Inspected August 22nd, 1906.—The furnace stack needed to be made higher. Brattices were in very bad order. Nowhere was the air sufficient. The entries were being driven ahead of crosscuts. Drainage was bad.

DOWLAIS MINES.

P. O., Jellico.

Transportation, L. & N. Railroad.

Operated by the East Tennessee Coal Co. E. J. Davis, President; W. E. Davis, General Manager; F. C. Richmond, Secretary.

1905.—The last inspections made by A. G. Spillman in 1905, were on July 20th, as follows:

No. 1 Mine.—The volume of air entering the mine was ample for the sixty-nine persons employed underground, but it was not well conducted to the working places. No lack of proper timbering was observed.

No. 2 Mine.—All operations confined to drawing pillars and stump, and conditions as good as could be expected.

Inspected August 27, 1906.—Middle Ridge Mine. This mine is nearly worked out. Timbering was deficient to properly safeguard the persons engaged in taking out the stumps.

DOWLAIS BLUE GEM MINES.

P. O., Jellico, Tenn.

Operated by the Dowlais Blue Gem Coal Co.

These consist of the old Blue Gem mine, to the right of the tram track, and a new mine on the left that is being opened up on the longwall system and equipped with electric mining machinery. When the fan is installed conditions will be good at this mine. The day of inspection the ventilation was natural and not good. Conditions at the old Blue Gem were satisfactory.

ELITE MINE.

P. O., Jellico, Tenn.

Transportation, L. & N. Railroad.

Operated by the Elite Coal Co., Lewis M. Scott, President; John Stone, Vice-president and General Manager; E. B. Barton, Secretary and Treasurer.

[1905.—The last inspection in 1905 was made on July 25, at which date neither drainage nor ventilation were good. More furnace power was needed.]

Inspected August 22, 1906.—The mine was poorly ventilated, several of the room-necks on the air course side having neither doors nor curtains. The company was installing machine mining in the new opening.

FRENCH MINE.

P. O., Halsey.

Main Office, Knoxville, Tenn.

Transportation, L. & N. Railroad.

Operated by the French Coal Co., F. French General Manager.

[1905.—The last inspection in 1905 was made July 21st. The mine was defective with respect to ventilation and drainage. Sufficient air was entering the mine to supply the 26 persons employed inside, but it was not properly conducted to the working places.]

Inspected August 23, 1906.—The volume of air entering the mine was ample, but poor brattices made a lack of pure air in the working places. The drainage at bank mouth was distinctive as bad.

HALSEY MINE No. 3.

P. O., Halsey.

Transportation, L. & N. Railroad.

Operated by the Anderson Coal Co., M. O. French, President; F. E. Halliday, Vice-president; A. B. French, Superintendent; S. M. French, Secretary.

This is one of the Louisville Property's mines that they have leased to this company.

[1905.—When examined this mine July 21st, 1905, ventilation and timbering were satisfactory, but there was too much mud and water on the main entry road.]

Inspected August 23, 1906.—Conditions were entirely satisfactory.

IMPERIAL JELICO MINE.

P. O., Rockhold.

Transportation, L. & N. Railroad.

Operated by the Imperial-Jellico Coal Co., J. W. Siler, President; John Morgan, Superintendent.

This mine is equipped with electric mining machines. The haulage is by mules to the inside lyeways, then by motors to the outside; then the mine cars are run down an incline to the tipple. Ventilation is with electric fan.

[1905.—Last inspected in 1905 on July 26th. There were 80 persons employed underground and only 7,950 cubic feet of air was entering the mine, which was not sufficient, and on account of the poor condition of the curtains this current was not properly conducted to the working places.]

Inspected August 16th, 1906.—No fault could be found with the timbering, the drainage was poor on first left. The current was split and poorly conducted to the working places.

SAXTON MINE.

P. O., Saxton.

Transportation, L. & N. Railroad.

Operated by the Jellico Mining Co., M. L. George, President and General Manager.

[1905.—Last inspection July 25th. Ventilation was satisfactory, but the props were not kept close enough to the faces of the rooms, and there was too much mud and water on the main entry road.]

Inspected August 28th, 1906.—The mine in the Jellico seam was nearly worked out and conditions were satisfactory. In the Blue Gem mine electric mining machine were installed, both the longwall and the breast machines being used. Ventilation is with an electric driven fan. Mine was idle when inspected. Conditions appeared to be good.

KENSEE MINES.

P. O., Kensee.

Transportation by L. & N. Railroad.

Operated by the Main Jellico Mountain Coal Co., T. C. du Pont, President; Hywel Davies, Vice-President; J. H. Barker, Superintendent.

[1905.—Last inspections for this year were made as follows: The North, or older mine, was examined on July 22d. The quantity of air entering the mine was sufficient, but it

was not well conducted. On No. 1 Face entry the drainage was not good. A new or Southside mine had been opened. On July 22d the mine was idle. The indications were that with the furnace going ventilation would be good. Drainage was bad in the Main entry.]

Inspected by A. G. S., May 11th, 1906.—The face of the New Haney entry was too far beyond the air, and the ventilating current did not travel the working places. Drainage and timbering were satisfactory.

Inspected by J. D. C., August 29th, 1906.—In the New, or Southside, mine the timbering and drainage were all that could be desired. The plan of the mine as to ventilation was bad; in fact, rooms were being driven the entire distance without crosscuts. It is the intention to do most of the room work after the mine is fully developed.

The North, or Old Mine was inspected August 29th. Ventilation was deficient on new Selby and Hicky entries. Too much reliance is here placed on check curtains instead of using trapdoors. More attention to drainage is needed.

MT. MORGAN MINE.

P. O., Williamsburg.

Transportation, L. & N. Railroad.

Operated by the Mt. Morgan Coal Co., F. B. Mahan, President; M. H. Maury, Superintendent.

The mining is with compressed air; mule haulage to the outside, steam motor to the knuckle; then the mine cars are run over an incline to the tippie.

[1905.—The last inspection for this year was made July 27th. All things were satisfactory.]

Inspected August 21st, 1906.—The ventilation and drainage of this mine have been well maintained, but lack of timbering was evident on Main entry.

MOUNTAIN ASH MINE.

P. O., Mt. Ash.

Transportation, L. & N. Railroad.

Operated by the Jellico Coal Mining Co., Arthur Groves,

President; W. T. Lewis, Vice-president and General Manager; W. J. Everett, Secretary and Treasurer.

Mining is with compressed air; electric motor haulage to the incline. Ventilation is by fan, with the current split in three circuits.

[1905.—When inspected July 10th, the last for the year, conditions generally were good.]

Inspected September 13, 1906.—A large portion of the current was leaking through the brattices without ever reaching any of the working places. Lack of timbers was noted in several rooms. Drainage in this mine has been brought to a high state of excellence.

PINE KNOT MINE.

The Pine Knot Coal Co. went out of business July 31, 1906, the company's lease having expired. No coal was mined after July 12th. The company had added a 10-ton H. R. Porter locomotive, to haul coal from the mine mouth to the tipple, in June, 1905.

PLEASANT VIEW MINES.

P. O., Pleasant View.

Transportation, L. & N. Railroad.

Operated by the Pleasant View Coal Co.

Inspected September 12th.—In the Blue Gem mine the conditions were bad in all respects. The Jellico mine was totally devoid of ventilation anywhere near the working places. Five open crosscuts were noted. Drainage bad, especially at bank mouth.

The Davisson mine, idle now, was inspected November 20th. Break-throughs were needed cut in the rooms and a check curtain placed on entry.

PROCTER AND GRINSTEAD MINES.

Mine Office, Red Ash.

Head Office, Williamsburg.

Operated by the Procter Coal Co., H. F. Finley, President and General Manager.

[1905.—Both mines were in good condition (except bad drainage in the Grinstead) when last inspected, July 24th.]

Inspected August 24th, 1906.—These mines were in very fair condition in all respects. In parts where robbing was going on careful attention was needed and was being given for the protection of labor.

ROGERS' BLUE GEM MINE.

P. O., Jellico.

Transportation, L. & N. Railroad.

Operated by James Rogers.

Inspected August 24th.—Natural ventilation was the dependence for air. When this mine is provided with proper means of ventilation all conditions should be good, as the mine is well drained and timbered.

THE STEARNS MINES.

P. O., Stearns.

Transportation, Ky. & Tenn. R. R. and Cincinnati Southern R. R.

Operated by the Stearns Coal Co., J. S. Stearns, Chairman; J. E. Butler, General Manager.

[1905.—The last inspections of the mines in this year were made on April 17th. The volume of air entering the No. 5 mine was ample for the number of persons employed underground, but the total current did not reach all of the working places as it should have done. Written instructions were given the company to sprinkle the 2nd Right entry before allowing any shots to be fired. No lack of proper posting was satisfactory.]

The volume of air (8,532 cub. feet) entering the North Main mine was ample for the 59 persons employed underground, but the ventilation was defective in that the ventilating current did not travel within 60 feet or less of all the working places as required by law. Timbering and drainage satisfactory.]

These mines, in 1906, consist of No. 1, or Bartels; No. 2, which is a little below Bartels, and Nos. 3 and 4 at Worley. These mines were inspected June 18-23 and September 18-19.

Fair mining conditions were being maintained, except at No. 2 mine, where improvement should be made in the manner of shortening the current through the working places on the blind side of the entries.

[The number of explosions at this company's mines (see chapter on Accidents) charged to "windy shots" and dust, seems without reasonable excuse. Shooting on the solid should be absolutely prohibited, excess of dust should be removed, and the mine throughout kept sprinkled.—C. J. N.]

SUNBEAM MINE.

P. O., Jellico.

Transportation L. & N. Railroad.

Operated by the Sunbeam Coal Co.

This is a small mine between Saxton and Jellico. Ventilation natural.

Inspected August 27th.—Ventilation not satisfactory. Furnace ordered placed at this mine.

WATTS CREEK MINE.

P. O., Watts Creek.

Transportation, L. & N. R. R.

Operated by the Watts Creek Jellico Coal Co., Isaac L. March, President; C. J. Tobias, General Manager.

[1905.—On July 28th, the date of last inspection this year, the mine was in satisfactory condition.]

Inspected August 16th, 1906.—Conditions were such that a warning notice was given.

Inspected September 11th.—Great improvement could be noted, but the mine was not yet in a lawful condition. An additional 20 days was granted.

Inspected October 3d.—All conditions satisfactory.

WENDER BLUE GEM MINE.

P. O., Halsey.

Transportation, L. & N. R. R.

Operated by the Wender Blue Gem Coal Co.

Inspected August 22d.—The mine was in a very unsatis-

factory condition in regard to ventilation. The company was getting ready to install machinery. Very little mining was being done at the time of the inspection.

WENDER'S JELICO BLUE GEM MINE.

P. O., Jellico.

Wagon mine. Operated by S. A. Wender. This is a little mine that was being cleaned up for the fall trade. Ventilation was natural.

Instructions were given how to fix the mine so it would comply with the mining law. Only one inspection (August 24) could be given to this mine.

VANDERPOOL MINE.

P. O., Halsey.

Transportation, L. & N. Railroad.

Operated by the Louisville Property Co., T. Cairns, Agent;

J. A. McBrayer, Mine Superintendent.

[1905.—On July 21st, the date of the last inspection made this year, ventilation was excellent. The company had installed an 8-foot Stein fan. Drainage was bad on the 4th Left and on the Main. Timbering was satisfactory.]

Inspected August 23d, 1906.—The belt of the fan gave out before the inspection was completed, so very little in regard to ventilation could be determined.

Inspected September 14th.—The currents were ample, but were not being forced near enough to the faces of the working places.

WEST JELICO MINE.

P. O., Strunk.

Transportation, Cincinnati Southern Ry.

Operated by the West Jellico Coal Co., W. E. DeLaney, President; R. T. McKeen, Vice-president; C. H. Keeton, Secretary and Treasurer; J. C. Walker, Manager; Sharp & Siler, Attorneys.

[1905.—The last inspection for this year was made June 20th. The mine was idle and had been for a month. The indi-

cations were that with a fire in the furnace satisfactory ventilation would be obtained, except on the 1st Right entry, where there were two open break-throughs.]

WESTERN DISTRICT.

The following counties producing commercial coal in 1905 and 1906 are included in this district; namely, Butler, Christian, Daviess, Hancock, Henderson, Hopkins, McLean, Muhlenburg, Ohio, Union, and Webster.

	1905	1906
Output of bituminous coal, in tons-----	4,682,057	5,788,491
Output of cannel, in tons-----	none	none
Production of coke, in tons-----	47,247	44,102
Employees -----	7,296	7,842
Average number of 10-hour days worked in 1906 -----		188

Reports by A. G. Spillman and A. J. Doss.

Inspections were made by Mr. A. G. Spillman, having supervision of the mines in Christian, Hopkins and Webster counties, and by Mr. A. J. Doss, having charge of the mines in Butler, Daviess, Hancock, Henderson, McLean, Muhlenberg, Ohio, and Union counties.

Mr. Spillman also made some inspections, in the early part of the year, or upon special occasions, in the counties over which Mr. Doss has especial supervision.

Butler County.

[In 1905 Assistant Spillman inspected the mines then in operation as follows: The Aberdeen Mine of the Aberdeen Coal and Mining Co., at Aberdeen, was inspected December 27th, and was found in bad condition. The furnace power was insufficient to properly ventilate the mine, in the first place, and, in the second, the airway leading to the furnace was choked by falls of slate. The company was directed to complete an air shaft that had been started some time before, to build a new furnace, and to clean out the airway. On the same date the West Aberdeen Mine, of Veachel Fleener, at Fleener, was inspected. The mine had just been opened, and only five persons were then employed inside. Natural means were depended upon for ventilation.]

During 1906, all mines were under the supervision of Assistant Doss, who makes the following report:

ABERDEEN MINE.

P. O., Morgantown.

Transportation, Green River.

Conditions fairly satisfactory. This is a thin vein of coal and is operated by a very few persons.

MORGANTOWN COAL & MINING Co.

P. O., Morgantown.

Transportation, Green River.

This mine had been closed most of the year until late in the fall, when it began to be worked by a small force. After they resumed operations it was in fairly good condition.

BEN TOPMILLER MINE.

Mine in bad condition. The system upon which it has been worked is very impractical. Timbering not good. Drainage fairly satisfactory.

Christian County.

(All inspections by A. G. Spillman, Assistant.)

EMPIRE MINE.

P. O., Empire.

Head office, Nashville, Tenn.

Transportation, L. & N. Railroad.

Operated by the Empire Coal and Mining Co., J. D. Anderson, President; W. H. Buttorff, Vice-president; W. T. Rutland, General Manager.

The mine is equipped with two center crank 16 by 18 Skinner engines, one Morgan-Gardner generator, one Milwaukee generator, one Jeffrey electric drill, three standard D. and one low vein Morgan-Gardner mining machines, two high

*The omission of dates from Mr. Doss's report of inspections was not noticed until too late to remedy the matter; to have supplied them would have necessitated, practically, rewriting his report.—C. J. N.

vein "17A" Jeffrey mining machines, and four thin vein "16A" Jeffrey mining machines.

[1905.—Last inspection, November 1st. Except that an important curtain at the 5th West was torn and of little value, the mine was in good condition.]

Inspected July 4, 1906.—The volume of air entering the mine was not ample for the number of persons employed underground, and there was cause of complaint, also, on account of the current not reaching the working places. The entry roads on the North Side were wet and muddy. No lack of necessary timbering was observed.

Inspected November 4th.—The company was sinking a new air shaft, and the intention is to install a larger fan at this shaft, as I directed upon my preceding inspection. When this is done, the ventilation will be improved. At this date, however, the ventilation was defective. The break-throughs between the rooms were too narrow in some instances.

Daviess County.

(Inspections and report for 1906 by A. J. Doss, Assistant Inspector.)

LOUIS HOBACK MINE.

P. O., Owensboro.

Transportation, wagons.

Inspected twice during the year. Ventilation was not satisfactory at first inspection; drainage bad on Main entry at second inspection.

GEORGE LUCAS MINE.

P. O., Owensboro.

Transportation, wagons.

Inspected twice during the year. Ventilation was not satisfactory; ordered hooks to be put on end of cars to prevent them running back down the slope, in case they should break loose.

OWENSBORO COAL & LAND CO.

P. O., Owensboro.

Transportation, electric haulage to city.

Inspected three times during the year. Ventilation very

inadequate at all three inspections. Finally gave company notice to put mine in safe and healthful condition or would proceed according to law. Timbering insufficient.

OVERSTREET & RUDY MINE.

P. O., Owensboro.

Transportation, wagons.

Inspected three times during the year. General conditions of this mine fairly good for the year, except that ventilation not quite satisfactory on second inspection on account of break-throughs being two narrow.

J. H. RUDY MINE.

Inspected twice during the year. Ventilation fairly good, but drainage and timbering bad. Water was coming from the old works.

[Notes by A. G. Spillman for 1905: *The Allen Deane Mine*, operated by the Owensboro Coal and Land Co., was examined on May 15th, and was found in satisfactory condition, except that a ladder or other suitable means of escape, was required in the airshaft. Directions to provide such means for escape were given. *The New Mine*, of the same company, which is a shaft 63 feet deep to the coal, was visited in October. Main entries had been started on each side of the shaft. The company had installed one Sullivan compressor, two Sullivan mining machines, and two 50 h. p. Atlas tubular boilers. *The Louis Hoback Mine* was examined on May 15th, and the ventilation was found to be defective, in that the air was not well conducted to the working places. *The Overstreet & Rudy Mine* was inspected May 13th, and found to be in satisfactory condition. *The James H. Rudy Mine* was inspected May 19th. The mine was idle at the time, but the indications were that the means employed for ventilation when the mine was in operation were totally inadequate. There were no safety catches, nor covers for cages, and no safety gates at the ground landing. Notice was given to remedy the evils complained of.]

Hancock County.

(Inspections and report for 1906 by A. J. Doss, Assistant Inspector.)

FENLEY COAL CO. MINE.

P. O., Martindale.

Transportation, L. H. & St. L. Railroad.

Two inspections of this mine. General conditions satisfactory throughout the year, except that drainage not quite satisfactory.

[Note by A. G. Spillman for 1905: I inspected this mine October 27th and found ventilation and timbering satisfactory, but the drainage was defective.]

Henderson County.

(Inspections and report for 1906 by A. J. Doss, Assistant Inspector, except as to one inspection of the Utopia Mine and one of the Magnolia Mine, made by A. G. Spillman, as indicated. Names of officials have been inserted by C. J. N.)

CORYDON COAL CO.

P. O., Corydon.

Transportation, I. C. R. R.

At neither of the two inspections of this mine could the proper amount of air be found. The fan was not run at a sufficient rate of speed to furnish enough air for the men employed underground. Timbering not good. Drainage satisfactory.

GREEN RIVER COAL CO.

P. O., Spottsville.

Transportation, L. H. & St. L. R. R. and Green River.

B. C. Hubbard, General Manager; Peter Connolly, Superintendent.

The ventilation was very insufficient on the first visit on account of a squeeze. On the second visit the mine was found closed and had been closed since August 20th, for the purpose of general repairs and to put up a new tippie.

JOHN ARCHBOLD COAL CO.

P. O., Bluff City.

Transportation, Green River.

The conditions of this mine were not good at any time visited during the year. The mine was being operated in violation of law by not having any safety catches on the cages.

KEYSTONE MINING & MFG. CO.

P. O., Henderson.

Transportation, I. C. R. R.

J. L. Nicholson, Manager. Since resigned.

Inspected three times during 1906. The circulation at the working places was not sufficient because break-throughs were made too narrow and too far apart. Drainage satisfactory. Timbering not good.

MAGNOLIA COAL & MINING CO.

Transportation, wagons.

P. O., Corydon.

O. T. Koonce, President; J. B. Gibson, Superintendent.

[Inspected by A. G. Spillman, February 24th. Natural means were depended upon for ventilation, and the air was not good. A fan was on the ground, however, and was installed shortly after the inspection. I did not visit the mine after the above date, as all the mines in this county were transferred to Mr. A. J. Doss.—A. G. Spillman.]

Conditions of this mine were generally good for the year.

PEOPLES' COAL CO.

Transportation, wagons.

P. O., Henderson.

Ventilation not kept up to working faces as it should have been. This mine was inspected three times. Timbering and drainage good.

PITTSBURG COAL CO. (BASKETT MINE.)

P. O., Baskett.

Transportation, L. H. & St. L. R. R.

Alexander Blair, General Superintendent.

Ventilation not good. Timbering and drainage fairly good. Inspected three times.

RASH DENTON & Co. (Now PANAMA COAL & COKE Co.)
P. O., Robards.

Transportation, wagons.

O. W. Rash, President; M. V. Denton, Manager; E. S. Blanks, Superintendent.

Sufficient amount of air entering the mine but not properly conducted to all working places. Timbering not very good. Drainage satisfactory.

SMITH MILLS COAL Co.

P. O., Smith Mills.

Transportation, wagons.

This mine was in fairly good condition except that the timbering might have been better as the top was bad.

UTOPIA COAL Co.

P. O., Curdsville.

Transportation, Green river.

R. H. Shiver, Treasurer and General Manager.

[Inspected by A. G. Spillman, May 30th.—A steam jet was depended upon for ventilation, and it was totally inadequate to properly ventilate the mine. The cross entries were driven without air courses, and the Main entry air course was choked with falls of slate and gob.—A. G. Spillman.]

Ventilation not satisfactory. Timber and drainage not good.

WM. HAYES & SONS.

P. O., Zion.

Transportation, wagons

Sufficient amount of air entering the mine but not properly conducted to all the working places.

[Notes by A. G. Spillman for 1905: The *Corydon Mine*, operated at this time by J. E. and L. O. Stapp was inspected November 29th, and the ventilation was so defective that I could get no measurement of the current. There were 12 persons employed underground. The *Magnolia Mine* was inspected November 29th. Natural means were depended upon

for ventilation, and the latter was bad. Notice was served on the company to at once install a fan or furnace. The *Peoples' Mine* was inspected December 2d. Ventilation, drainage and timbering were satisfactory, but I found 15 persons underground, although there is but one opening to the mine. The company's attention was called to the fact that having such number of persons underground at one time when there is but one opening is in violation of law. The *Pittsburg Coal Co.'s Baskett* mine was inspected in November and all conditions found satisfactory. An air shaft had recently been sunk on the South side of the mine, which was serving as an upcast. On November 27th I passed by the new mine which had been opened at Robards by Rash Denton & Co.; the cages had not yet been put in. The *Smith Mills Mine* was examined November 29th. The steam jet which has served to ventilate the mine is no longer adequate. Notice was given to install a fan at once, as there is fire damp in the mine. Directions were also given to repair the left-hand cage, loosing from the engine room; the guides are too narrow and too thin. The mine of *Wm. Hayes & Sons*, at Zion, was examined December 2d. A check curtain was needed on the first entry, between rooms 1 and 2. Otherwise the mine was in good condition. The *Henderson Mine*, which was operated by J. L. Nicholson & Co., was inspected November 28th. It was in very defective condition. The mine has since then been closed, Mr. Nicholson transferring his attention to the Keystone mine. The Arnold mine of the *Green River Coal Co.* was inspected October 28th. A check curtain was needed on the third Right entry, between rooms 3 and 4. Directions were given to keep the Main Right entry sprinkled, as too much dust accumulates there. All other conditions satisfactory.]

Hopkins County.

(Inspections and report by A. G. Spillman, Assistant Inspector.)

CARBONDALE MINE.

Mine Office, Carbondale.

Transportation, Illinois Central Railroad.

Operated by the Carbondale Coal & Coke Co. B. Owen,

President, Paducah; John Palmer, Superintendent at Mines.

The mine was maintained in an excellent condition in all respects during the year.

CRABTREE MINE.

Head Office, Ilsey.

Transportation, Illinois Central Railroad.

Operated by the Crabtree Coal Mining Co. Edward Ilsley, President; R. M. Salmon, General Manager; John Harlan, Superintendent. The coal cutting machinery consists of 12 Harrison pick mining machines. Power is furnished by a Norwalk Compressor.

[1905.—When inspected on November 20th, all conditions were satisfactory.]

1906.—Two inspections were made. On July 2d the mine was in an excellent condition in all respects. On October 2d, there was too much water on the 9th East entry, and the ventilation was defective on the 11th and 12th West entries.

DANIEL BOONE MINE.

Mine Office, Daniel Boone.

Transportation, Illinois Central Railroad.

Operated by the Daniel Boone Coal Co. W. C. Knight, President; Richard Palmer, Superintendent. On January 1st, 1907, this company was succeeded by the Stirling Coal & Coke Co., with D. F. McMillan, President; Andrew Hogg, Treasurer and General Manager; Hugh McMillan, Secretary. The mine is equipped with 1 Morgan-Gardner Generator, and 5 Morgan-Gardner chain breast mining machines.

[1905.—Inspected November 14th. There were fifty-four (54) persons employed in the mine, and the volume of air entering the mine was ample for the number, but on account of there being no check curtains on the entries the current does not travel within 60 feet or less of the working places as required by law, and the mine was very smoky and unhealthful. Drainage and timbering satisfactory.]

1906.—Inspected June 25th. There were seven rooms on the cut-off entry that were without ventilation. The face of the 5th North entry was 150 feet ahead of the air, and the

face of room No. 6 on the 7th West was 84 feet ahead of the air. There was too much mud and water on the entry roads.

Inspected November 22nd. It is deemed best to give the notice in full as follows:

"First East; 24 persons. Rooms 4 and 5 are driven in 155 feet without break-throughs, and the face of room No. 6 is 120 feet ahead of the air. The break-through between this entry and the Second East is only 4 feet 9 inches wide, and the break-through between the 3d, and 4th, South entries is only 4 feet and 3 inches wide. These break-throughs are entirely too narrow.

"Third South; 6 persons. Room No. 2 is in 90 feet without a break-through, and room No. 3 is in 120 feet without a break-through. Break-throughs must be made at once between these rooms, and a check curtain hung on the entry between rooms 2 and 3, as soon as another break-through is made near the face of the entry. Break-throughs must be made every 60 feet in rooms, as well as entries. The atmosphere in these rooms was smoky, and unhealthful.

"The brattices between the fan and working parts of the mine all leak, and the air escapes to the return that should go to the diggers.

"I have not seen a mine, in a long time where the roads were as dirty as in the case of this mine. They are muddy also, and in bad condition.

"When I inspected this mine on June 25th, it was in a very defective condition with respect to ventilation and drainage (as it now is), and I was given positive assurance by your Mr. Ellis, that it should be improved, but I see that nothing has been done.

"Now I have no desire to cause you any trouble, but I shall inspect your mine again in twenty (20) days, and if you have failed to place the mine in the proper condition with respect to ventilation and drainage, as required by law, it will be my duty, (and I shall not fail to preform it) to enjoin you from working more than five (5) persons at one time inside, and to also have your company indicted. I trust therefore you will pay attention to this warning notice."

This inspection notice was mailed direct to Mr. W. C. Knight, President of the Daniel Boone Coal Co., at Memphis, Tenn.

Upon receipt of the notice by Mr. Knight, he addressed the following letter to me:

“Memphis, Tenn., Nov. 28th, 1906.

“Mr. A. G. Spillman,

“Assistant Inspector of Mines,

“Lexington, Kentucky.

“Dear Sir:—Yours of the 26th. duly to hand. I will instruct Mr. Palmer to go to work on the brattices and roads at once. I was in the mine some two weeks ago, and I found the roads I thought to be in good condition, but if you remember we had some very heavy rains since that time. Of course that would naturally make the mine wet, and cause bad roads. I have not had one complaint about the air or bad roads from any of the men that work in the mine. I have also had a very poor set of foremen, and being myself inexperienced at the mining business, and what time I have spent in the mine has not given me sufficient knowledge to know the course the air should go. I ask your kind indulgence until I can get the mine in better shape, as you know labor is very scarce, and the demand for coal is very good, so I would like to get out coal while the demand continues good, and after demand slackens, I will put the mine in the best shape possible. If you will be kind enough to write me the day you expect to be at Daniel Boone, I will be glad to meet you and present to you the conditions I have been working under. Trusting that I may be able to have the mine in better shape when you inspect again.”

On November 30th, I replied to this letter as follows:

“Dear Sir:—Replying to your favor of the 28th. will say that I will be glad to meet you at the mines, although it is not the policy of this office to notify mine operators when we expect to visit the mines. In regard to your suggestion that I wait until the coal business gets slack, beg to say that if this was done the mining law would be of no effect. The kind of work to be done to place your mine in the proper condition as required by the mining law can be done just as well when the mine is running steadily, as when it is running slack. Then too, it will help you to get out coal to have your mine in good condition. Men will work better, also, when the ventilation is good.”

Inspected December 29th.—Little improvement had been made in the underground conditions, but every thing was being done as fast as could be, and with the assurance that my instructions should be complied with, further proceedings were held in abeyance.

KINGTON & WOLF MINE.

This mine, which was operated near Mortons Gap by the Kington & Wolf Co. in 1905 was closed, as a commercial mine, in 1906. When inspected in 1905 it was found in a satisfactory condition.

NORTONVILLE MINES.

Head Office, Nortonville.

Operated by the Nortonville Coal Co. Frank M. Fisher, President, Paducah; John B. Trice, Vice President, Hopkinsville; Walter S. Elgin, General Manager, Nortonville.

Mine No. 1. Transportation, Illinois Central Railroad. The coal is mined by 1 Jeffrey, and 4 Goodman chain breast mining machines. Power is furnished by 2 Goodman Generator.

[1905.—Inspected November 2d.—The mine was in excellent condition in respect to ventilation, drainage and timbering; but there was no means of escape provided in the shaft intended for the man way. Written notice was served on the company directing it to remedy this at once.]

1906.—Inspected June 23d. Ventilation, drainage and timbering satisfactory.

Inspected September 17th. Props were too far from the faces of the rooms on the First East entry, and a check curtain was needed on the Third West entry at room No. 11. All other conditions satisfactory.

Mine No. 2. Transportation L. & N. Railroad. The coal is mined by 3 Goodman chain breast machines. Power is furnished from the No. 1 mine.

[1905.—I examined this mine on November 2d. The volume of air entering the mine was ample for the number (44) persons employed underground, but on account of there being no check curtains on the entries the current did not travel within 60 feet or less of the working places as required by

law. The proper written notice was given directing the company to remedy the evils.

1906.—Inspected June 23d. The mine (a slope) is ventilated by a 10-foot Coles fan. The current did not serve the working places as it should have done. Drainage satisfactory, and no neglect to properly timber the working places was observed.

Inspected December 29th. The face of the 6th North entry was 100 feet ahead of the air. There were five (5) rooms turned off the Main entry that were without ventilation. The drainage was bad on the 4th North entry.

OAK HILL MINE.

Mine Office, Chesley.

Head Office, Madisonville.

Transportation, L. & N. Railroad.

Operated by the Oak Hill Coal Co. until April 1st, when it was taken over by the Brasher Coal Co. This company operated the mine until July 1st. Since that time it has been owned and operated by the Chesley Coal Co., with J. M. Cook, President; James Abercrombie Superintendent.

The mine is equipped with a Goodman generator, one Morgan-Gardner generator, one Goodman chain breast mining machine, and four Morgan-Gardner chain breast mining machines. The coal was formerly hauled from the mine to the tipple with a steam locomotive, but since the mine has been operated by the Chesley Coal Co. this has been replaced by a 10-ton Goodman electric locomotive.

[1905.—I inspected this mine November 2d. The mine was idle, the fan was not running, consequently I could not accurately determine the quantity of air entering into and flowing through the mine. All indications, however, showed that with the fan in operation the ventilation would be satisfactory.]

1906.—Inspected June 23d. The volume of air entering the mine was ample for the underground employes, but the current did not travel within 60 feet or less, of all the working places as required by law.

Inspected November 22d. The rooms on the 12th West entry were without ventilation, and there was too much mud

and water on the Main entry haulway. Conditions elsewhere in the mine were satisfactory.

REINECKE MINE.

Head Office, Madisonville.

Transportation, L. & N. Railroad.

Operated by the Reinecke Coal Mining Co. Conrad Reinecke, President, Belleville, Ill.; Fred Reinecke, General Manager, Madisonville; Emil Braun, Superintendent of mines. The coal cutting machinery consists of 9 Jeffrey, and 3 Goodman chain breast machines. Power is furnished by 2 Westinghouse Generators, 150 k. w. each.

[1905.—I examined this mine November 22d. Ventilation was satisfactory except on the 16th East entry. The rooms were being driven 30 feet wide, and as a consequence some of them are being lost by the roof falling in. It was suggested that the rooms be narrowed down to 24 feet in width. Drainage satisfactory.]

1906.—Except on June 19th, when sufficient attention was not given to the proper posting of the rooms, the mine was maintained in good condition throughout the year.

ROSE CREEK MINE.

Mine Office, Nebo.

Transportation L. & N. Railroad.

Operated by the Rose Creek Coal Co. James West, President; Rankin Eastin, Superintendent at mine. The mine is equipped with one Jeffrey generator and three Jeffrey chain breast machines.

[1905.—I examined this mine November 27th, and found the ventilation, drainage and timbering very satisfactory.]

1906.—Inspected June 20th. The mine (a slope) is ventilated by a fan. There were four open break-throughs on the 4th West entry; three on the 4th East entry, and three on the Main South entry. As the result of this, there was no current within 60 feet of the working places as the law directs. Drainage and timbering satisfactory.

Inspected October 6th.—The air-way leading from the fan to the working places in the mine was choked with gob. In

addition to this, the brattices throughout the mine were in poor condition, and the air nearly all wasted to the return, and did not reach the men.

ST. BERNARD MINING CO.'S. MINES.

Head Office, Earlington.

Operated by the St. Bernard Mining Co. John B. Atkinson, President; Geo. C. Atkinson, Secretary and Treasurer; Frank D. Rash, General Manager

Arnold Mine.—Mine office, Earlington, Transportation, L. & N. Railroad.

[1905.—I examined this mine November 16th and found all conditions excellent. See Notice No. 979.]

1906.—Inspected twice, and all conditions found to be satisfactory.

Barnsley Mine.—Mine Office, Earlington. Transportation L. & N. Railroad.

[1905.—Inspected November 4th and found to be in excellent condition.]

1906.—Two inspections were made and conditions found satisfactory on each occasion.

Diamond Mine.—Mine Office, Mortons Gap. Transportation L. & N. Railroad.

[1905.—Inspected November 16th and found to be in an excellent condition in all respects.]

1906.—This mine was inspected twice, and all conditions were excellent.

Earlington No. 9 Mine.—Mine Office, Earlington. Transportation, L. & N. Railroad.

[1905.—I examined this mine November 3d, and found ventilation, drainage and timbering satisfactory.]

1906.—Two inspections were made, and on each occasion the mine was found in an excellent condition.

Earlington No. 11 Mine.—Mine Office, Earlington. Transportation, L. & N. Railroad.

[1905.—Inspected November 17th, and found to be in an excellent condition.]

1906.—This mine had been maintained in an excellent condition throughout the year. Two inspections were made.

Hecla Mine.—Mine Office, Earlington. Transportation, Il. & N. Railroad.

[1905.—I inspected this mine on November 17th. A check curtain was needed on the 2d West entry, between rooms 32 and 33. In the remainder of the mine the conditions were excellent.]

1906.—On November 25th there was cause for complaint on account of the failure to send the air within 60 feet or less of the room faces. At all other times the conditions were satisfactory.

St. Charles Mines.—Mine Office, St. Charles. Transportation, Illinois Central Railroad.

[1905.—I inspected the Fox Run mine on November 15th and found it to be in excellent condition.]

1906.—Two inspections were made. The mine was, in general, in good condition.

VICTORIA MINE.

Mine and Head Office, Madisonville.

Transportation, L. & N. Railroad.

Operated by the Victoria Coal Co., James R. Rash, President; George W. Rash, Secretary; Geo. C. Atkinson, Treasurer.

The mine is equipped with one 100 k. w. Link-Belt generator, one 125 k. w. direct connected Goodman generator, and eight Goodman chain-breast mining machines.

[1905.—I examined this mine on November 18th and found ventilation, drainage and timbering satisfactory.]

1906.—Inspected twice and found in a satisfactory condition in all respects on each occasion.

ROYAL MINE.

Head Office, Madisonville.

Transportation, L. & N. Railroad.

Operated by the Brasher Coal Co. until October 1st, 1906, and after that date by the Chesley Coal Co., J. M. McCook, President; James Abercrombie, Superintendent.

distance of 1,300 feet. On May 23d, I examined the Island Mine of the Green River Coal & Coke Company. Plenty of air was entering the mine, but, on account of there being no check curtains on the entries, the current did not travel within the legal distance of the room faces. Notice was given the company to comply with the law. On May 22d the Field mine of the Memphis Coal Company was examined, and ventilation and timbering found defective. There was too little air entering the mine for the seventy to seventy-five persons underground, and what did enter did not reach the working places. Props were too far back from the faces of all rooms. —A. G. Spillman.]

Muhlenberg County.

(Inspections and report for 1906, by A. J. Doss, Assistant Inspector, except when otherwise indicated. Names of officials inserted by C. J. N.)

BEECH CREEK COAL CO.

P. O., Beech Creek.

Transportation, L. & N. Railroad.

A. D. Kirkpatrick, Manager.

Twice inspected. Ventilation not satisfactory in all working places, although the required amount of air was entering the mine. This was due to lack of break-throughs and curtains being properly arranged. Second outlet provided after first inspection.

BEVIER COAL COMPANY.

P. O., Cleaton.

Transportation, L. & N. Railroad.

J. W. Bastin, President; J. C. Brown, General Manager.

Two inspections. At the first inspection ventilation was found to be very inadequate as the required amount of air was not entering the mine, the fan not being run fast enough. This was remedied at the time of the second inspection in so far as the amount of air entering the mine, although all working places were not ventilated in a satisfactory manner, on account of break-throughs not being closed and curtains not hung where needed and some of them being in bad repair. Drainage not quite satisfactory, especially on main entry.

BROWN-LAM COAL COMPANY. (SINCE CHANGED TO GIBRALTER.)

P. O., Hillside.

Transportation, Illinois Central Railroad.

The three inspections made of this mine during the year showed it to be in a fairly satisfactory condition as regards ventilation, but drainage has been poor all the time.

BLACK DIAMOND COAL & MINING Co.

P. O., Drakesboro.

Transportation, L. & N. Railroad.

James T. Pierce, President; J. W. Bridges, Superintendent.

Considerable trouble was had in getting anything like proper ventilation in this mine. Four inspections were made. Twenty days' legal notice was finally served on the company on July 5th, and efforts were made to improve the condition of the mine. There was a serious explosion on July 12th, seriously burning a number of persons and doing some damage to the mine. This explosion was caused by a lack of ventilation in all parts of the mine. Conditions have greatly improved there during the year, as the fan slope has been cleaned out and curtains have been placed on entries where firedamp is generated. Drainage not entirely satisfactory. Timbering has also been neglected.

[On May 12th the mine was inspected by A. G. Spillman. There were twenty-seven persons employed on the East Side and thirty-eight on the West Side of the mine. There were 19,304 cubic feet of air entering the mine, which was ample, but the current did not reach all of the working places as required by law. Sufficient attention was not given to the proper propping of the rooms, and the drainage in some places was bad.

[On July 13th, following an explosion which occurred on the 12th, by direction of the Chief Inspector I visited the mine again, and made report as follows: "Lexington, Ky., July 14, 1906. Prof. C. J. Norwood, Chief Inspector of Mines. Dear Sir: On July 12th there was an explosion in the Pierce No. 9 mine of the Black Diamond Coal & Mining Co., at Drakesboro,

which resulted in the burning of Tom Creasy, Ray Bennett, Ed. O'Neill, Ben Holman, Edgar Price and Ed. Boyd; and in W. R. Garrett (the mine foreman) being blown against the side of the entry and his head badly cut. According to instructions from you—Mr. A. J. Doss, in whose territory the mine lies, being in the field and his whereabouts uncertain at the time—I investigated the accident of July 13th. I found that the explosion occurred in room No. 1 on the Fourth West blind entry, and was caused by the ignition of firedamp which had accumulated in said room. The room was an old one, and had been abandoned for some time, and a lot of dirt and gob had been thrown in the neck of the room nearly filling it. It seems there had been a fall in the room the night before, and that it had let in a quantity of water. Mr. Garrett and the men who were with him when burned were endeavoring to find whence the water was coming, when some one (no one seems to know which it was) put his head in the room neck over the pile of dirt, and, having his lighted lamp in his cap, he ignited the gas. I found, when I reached the mine, that the brattices had all been blown down, and the ventilation was very much disturbed in that part of the mine, but the brattices were being rebuilt. In company with a Mr. Johnston, I went into the Fourth West blind entry, and into said No. 1 room, with a safety lamp. I found some gas in the room-neck, but could not detect any at any other place. On the day of this investigation I could not see where any provision had been made to send the air through this room to render harmless the noxious gases that are found in such abandoned places. If there had been an adequate quantity of air constantly passing through said room (as there should have been), in all probability the explosion would not have occurred."—A. G. Spillman.]

CRESCENT COAL CO.

P. O., Bevier.

Transportation, L. & N. Railroad.

W. R. Cole, President; F. P. Wright, Superintendent.

The general conditions at this mine were very satisfactory the year through. It was twice inspected and on the first

visit there were some portions of the mine in which the proper amount of air was not circulating.

CENTRAL COAL AND IRON COMPANY, CENTRAL MINE.

P. O., Central City.

Transportation, I. C. and L. & N. Railroads.

T. C. du Pont, President; Wm. D. McIlhinney, Treasurer.

Ventilation not very satisfactory due principally to air-courses not being cleaned out and property arranged on East Side, and changing the system of operating the mine on the West Side the company being at the time of the last inspection engaged in arranging to haul coal on the West Side by motor, which necessitated many changes in that side of the mine. Drainage not very good. Timbering not entirely satisfactory.

DOVEY COAL COMPANY.

P. O., Central City.

Transportation, I. C. Railroad.

Hywel Davies, President; Wm. Jones, Superintendent.

At the first of the two inspections of this mine; ventilation was not very good on one entry and drainage was bad in the whole mine, but at the last inspection everything was satisfactory.

ELK VALLEY COAL CO.

P. O., Drakesboro.

Transportation, L. & N. Railroad.

C. W. Adams, President; J. M. Thompson, Manager.

This is a new mine and the general conditions were not satisfactory. The required amount of ventilation was not reaching some of the working places.

GREENVILLE COAL CO.

P. O., Powderly.

Transportation, I. C. Railroad.

C. M. Martin, Manager; Herbert Myers, Superintendent.

New opening. Had neither fan or second outlet at first

inspection, June 25th. Both were directed to be provided, which was done. Timbering and drainage not good.

OAKLAND COAL CO., OAKLAND MINE.

P. O., Hillside.

Transportation, I. C. Railroad.

J. W. Lam, Manager.

The fan was not run steadily and the air was thus not kept pure. Timbering not good. Drainage satisfactory.

HILLSIDE COAL CO., WOODSON MINE.

P. O., Hillside.

Transportation, I. C. Railroad.

Wm. Eades, Manager.

Three inspections were made of this mine during the year. The proper care was not taken to see that adequate ventilation reached all working faces. Timbering neglected in nearly all rooms in the mine.

HOLT COAL COMPANY.

P. O., Central City.

Transportation, L. & N. Railroad.

Operated by Holt Coal Co., E. W. Holt, Superintendent.

This is a new mine. It was inspected twice during the year. Owing to the fact that it is a new mine, breakthroughs had not been properly arranged to cause satisfactory ventilation throughout the mine. Drainage not good on north side of Main entry.

LAM COAL COMPANY.

P. O., Bevier.

Transportation, L. & N. Railroad.

T. E. Sumner, Manager; Herman Sumner, Superintendent,

It was necessary to inspect this mine six times during the year, and in order to get the mine in anything like a conformity to the requirements of law, an injunction had to be sued out, which was granted on November 28th. The company was restrained from employing more than five persons

under ground. The trouble was that the way of creating ventilation was very insufficient and there was also a lack of trapdoors and break-throughs. It was inspected after the injunction, December 8th, and conditions were found to be greatly improved, a fan having been installed and trapdoors and break-throughs arranged where needed. After the requirements of the law had been met the injunction was dissolved.

LOUISVILLE-ATLANTA COAL CO.

IP. O., Drakesboro.

Transportation, L. & N. Railroad.

Jno. Kettinger, President; S. A. Brasher, Manager.

Four inspections of this mine were necessary. The ventilation was not satisfactory on account of brattices and break-throughs not being kept up as needed, and the air shaft was not large enough and the fan not stationed at the proper place. The twenty days' legal notice was given this company to put the mine in a condition to conform to the requirements of law. After this notice, conditions were somewhat improved.

R. MORGAN COAL, COKE & MINING CO.

P. O., Central City.

Transportation I. C. Railroad.

R. Morgan, President and Superintendent.

Inspected twice during the year. Ventilation, timbering and drainage poor.

W. G. DUNCAN COAL COMPANY'S MINES.

P. O., Luzerne.

Transportation, I. C. Railroad.

W. G. Duncan, President; C. W. Taylor, Superintendent.

Luzerne Mine.—Two inspections. Ventilation not satisfactory. Drainage bad, due to water coming in from surface through top.

Graham Mine.—At the first inspection, the ventilation was found insufficient and a fan was directed to be installed. At the second visit, the fan had been installed and the ventila-

tion was found improved. Drainage and timbering good.

Skibo Mine.—The method of creating ventilation by a small basket was not sufficient, and a fan or furnace was directed to be installed. At the second visit the ventilation was still not satisfactory because a number of breakthroughs had been left open that should have been closed. Mine in satisfactory condition as regards drainage and timbering.

W. A. WICKLIFFE COAL CO.

P. O., Browder.

Transportation, L. & N. Railroad.

W. A. Wicklice, President; E. Reynolds, Superintendent.

Inspected twice during the year 1906. This mine generates gas, and the proper care has not been observed in making break-throughs. The proper amount of air did not circulate to many of the working places. Neither was timbering and drainage satisfactory.

[The mine was inspected by A. G. Spillman on February 27th and found to be in a satisfactory condition. Ventilation is procured by use of a 12-foot Crawford & McCrimmons fan.]

[Notes by A. G. Spillman for 1905.—On April 25th, instructions were given the *Black Diamond Coal and Mining Co.* to clean out and retimber the slope, as it was choked with dirt and did not conform to the requirements for a second outlet. On April 28th, an examination of the *Bevier Mine* showed that the ventilation and drainage were good, but that the propping of rooms was defective. An examination of the *Crescent Mine* on April 27th revealed that it was generally in good condition, with the exception that props were too far from the faces of rooms on the 9th West blind. When the *Central Mine* was inspected on April 29th, it was found that propping in rooms was not well enough attended to; other conditions were good. On December 28th and 29th, all conditions were found to be satisfactory. The *Dovey Mine* was inspected December 9th. While ventilation and drainage were satisfactory, sufficient attention was not paid to keeping the rooms properly propped. The rooms were being driven too wide. On December 8th, the *Powderly Mine* of the Greenville Coal Co. was found in satisfactory condition. The company was opening a new mine

across the railroad from the old one, with the intention of abandoning the old one in the then near future. The Holt mine was being opened in November. The Woodson mine was being opened in November. The Main entry of the Lam Coal Company's mine at Bevier (a drift in No. 9 coal) had been driven in only about 200 feet in April. The Louisville-Atlanta Coal Co. took over the mine formerly worked by the Drakesboro Coal, Coke and Mining Co. October 1st. When the mine was examined on April 25th, directions were given the Drakesboro Coal, Coke & Mining Co. to repair and hang the safety gates, and to provide a second entry. The mine of the *R. Morgan Coal, Coke & Mining Co.* was inspected December 9th. Breakthroughs were not closed up regularly between rooms as they should be, and the rooms were being driven too wide. Notice was given the company to correct the evils, and to drive the rooms no more than 22 feet wide. The *Graham* and *Skibo* mines of the W. G. Duncan Coal Co. were examined December 7th. The *Skibo* was found in satisfactory condition, but the air-current in the *Graham* mine was not well conducted to the working faces. In other respects the *Graham* mine was in good condition. The *Oakland Mine* was inspected December 8th. The right hand cage, looking from the engine room, was not safe. Orders to make it safe were given. Directions were given to provide a new brake for the drum. The main airway leading to the fan needed cleaning up. The *Hillside Mine* was examined December 8th. In consequence of leaky brattices, ventilation was defective. Props were not kept close enough to faces of rooms. The *Wickliffe Coal Co.'s* mine was visited August 22d. All that had been done underground was to make connection between the hoisting shaft and air shaft.—A. G. Spillman.]

Ohio County.

(Inspections and report for 1906, by A. J. Doss, Assistant Inspector.)

BROADWAY COAL AND MINING CO.

P. O., McHenry.

Transportation, I. C. Railroad.

W. W. Simmons, President; Geo. M. Burton, Superintendent.

Ventilation fairly good, but drainage was very bad and timbering was not good.

CENTRAL COAL & IRON CO., RENDER MINE.

Mine P. O., Render.

Main Office, Central City.

Transportation, I. C. Railroad.

W. D. McElhinney, Manager; Simon Jones, Superintendent.

Ventilation very satisfactory. Drainage very bad. Timbering not good in all parts of the mine

FORDSVILLE BLOCK COAL CO.

P. O., Fordsville.

Transportation, I. C. Railroad.

Samuel Gaines, Manager.

Ventilation was the best point in the conditions of this mine. It was very poorly drained, there being much mud and water. It is a thin vein of coal, running from 3 to 4 feet in thickness. Proper attention was not given to timbering.

DEANEFIELD COAL CO.

P. O., Aetnaville.

Transportation, I. C. Railroad.

Manager, Guy M. Deane; O. D. Moorman, Superintendent.

The condition of this mine was very unsatisfactory, the mine being almost completely drowned out on my last visit. The mine is worked on a very poor system.

GREEN RIVER COAL MINING MFG. & TRANS. CO.

(NOW GREEN RIVER COAL MINING CO.)

P. O., Coffman.

Transportation, Green River.

Ventilation and timbering not entirely satisfactory at either of the three inspections made of this mine. Timbering very bad.

MCHENRY COAL COMPANY.

P. O., McHenry.

Transportation, I. C. Railroad.

W. D. McElhinney, Manager; David Watkins, Superintendent.

McHenry Mine—Ventilation not as good as it should be to all parts of the mine, although it was somewhat improved on the date of the last visit, Nov. 17th.

Echols Mine.—All conditions of this mine perfectly satisfactory. The mine foreman, Mr. W. L. Russell, is a very competent man, both from practice and theory, and has kept his mine at all times in first class condition.

PEACOCK COAL CO.

P. O., Reynolds Sta.

Transportation, I. C. Railroad.

This mine was practically shut down during the year, and very few men were at any time employed under ground. It was found in a very bad condition when inspected and the system upon which it was being worked was very poor.

TAYLOR COAL COMPANY OF KY.

P. O., Taylor Mines.

Transportation, I. C. Railroad.

J. B. Speed, President; M. M. Bardwell, General Manager.

Old Straight.—Ventilation and drainage have not been entirely satisfactory. Timbering has been kept very good.

New Opening.—Ventilation not at all satisfactory in some parts of the mine. The furnace was not fired enough to furnish a sufficient quantity of air. The ventilation was somewhat improved on the last visit, December 5th. Timbering and drainage have been looked after very well.

WILLIAMS COAL COMPANY.

P. O., McHenry.

Transportation, I. C. Railroad.

I. P. Barnard, President; M. M. Bardwell, General Manager.

Ventilation has not been satisfactory at this mine, due at

first to the low rate of speed at which the fan was run, and afterward the current of air going up Main Straight was not sufficient to put the required amount of air at hardly any of the working places supposed to be supplied by this current. Timbering and drainage not entirely satisfactory.

[Notes by A. G. Spillman for 1905.—When inspected on May 18th, the *Render Mine* of the Central Coal & Iron Co. was found in excellent condition. On August 24th an examination of the Shaft mine of the *Deanefield Coal Co.* showed it to be well ventilated, but drainage and timbering were unsatisfactory. On December 30th another inspection was made. The steam pipe that had been used as an exhaust to ventilate the mine was broken, hence no measurement of air could be made anywhere in the mine. Notice was given the company to provide a furnace or equivalent of sufficient power to properly ventilate the mine. The mine of the *Fordsville Block Coal Co.* was idle a considerable part of the year. In May the company was building a tippie. On inspection of the mine was made December 30th. Although the mine was in operation, there was no fire in the furnace, and I was informed there had been none the day before. Notice was given the company to fire the furnace every day that the mine is worked. Drainage on the Main entry was miserable. Sufficient attention is not given to posting the rooms. The Jamestown mine, which was being operated by W. U. Grider, Receiver for the *Green River Mining, Manufacturing and Transportation Co.* at the time, was examined May 23d and found in satisfactory condition. The *McHenry* and *Echols* mines were inspected May 19th and 20th; each was found to be in excellent condition. *Taylor Mines* No. 1 and No. 2 were inspected May 17th. In No. 1 sufficient air was entering, but it was not well conducted to the faces. Similar criticism was applicable to No. 2. The *Williams Mine* was inspected May 18th and found in a satisfactory condition.—A. G. Spillman.]

Union County.

Union County.

(Inspections and report for 1906 by A. J. Doss, Assistant inspector, except when otherwise indicated. Names of officials inserted by C. J. N.)

BELL-UNION COAL & COKE CO.

P. O., Curlew.

Transportation, I. C. Railroad.

Henry Brooks, President; J. F. Harth, Manager; W. F. McMurray, Superintendent.

There was no practical way to ventilate this mine, and sufficient amount of air failed to circulate to many of the working places. Timbering bad in portions of the mine. It was twice inspected.

B. C. DAVIDSON & SONS.

P. O., Uniontown.

Transportation, wagons.

Proper amount of air was entering the mine but did not reach the working places according to the requirements of law. Instructions were given to put safety gates at the top of the shaft.

THOMAS COAL CO.

P. O., Morganfield.

Transportation, I. C. Railroad.

C. C. Thomas, President; J. N. Hawkins, Superintendent.

This mine was inspected three times in 1906. Ventilation very insufficient throughout the entire year. Timbering and drainage satisfactory. Safety gates were directed to be put up, which was done.

MARION COAL CO.

P. O., Sullivan.

Transportation, I. C. Railroad.

James W. Lamb, President and Superintendent.

This mine was inspected four times. Ventilation, timbering and drainage all bad at first, but at the date of the last inspection, Nov. 21st., the ventilation was somewhat improved.

[Inspected on April 30th by A. G. Spillman.—There were twenty-four persons employed under ground, and at no place in the bank could I find a current of air of sufficient strength to enable me to get a measurement. The furnace power was totally inadequate to properly ventilate the mine. Twenty (20) days were given the company to provide a fan or furnace of ample power to produce the required ventilation.]

[Again inspected the mine on May 24th. There was very little improvement in the mine with respect to ventilation, but a fan was on the ground, and preparations were being made for the installation of same. Information was subsequently received that this was done.—A. G. Spillman.]

MORGANFIELD COAL & MINING CO.

P. O., Morganfield.

Transportation, I. C. Railroad.

W. H. Lloyd, President; T. A. Cartwright, Superintendent.

This mine was inspected four times in 1906. The mine was in bad condition as to ventilation at the first three inspections, but on the last inspection, November 23d, a fan had been installed and the ventilation had been very much improved. Drainage was still poor.

OHIO VALLEY COAL & MINING CO.

P. O., Dekoven.

Transportation, I. C. Railroad and Ohio River.

G. W. Theiss, President; S. P. Sturgis, Manager; John Whitehead, Sr., Superintendent.

At first ventilation was good. On the last visit, September 26th, the air was mixed with black damp and was very impure. This was because the fan was not run at a high enough rate of speed. Directions were given to overcome this difficulty by increasing the speed of the fan. Drainage and timbering were very good.

SOUTHERN TIDEWATER COALING CO.

P. O., Uniontown.

Transportation, I. C. Railroad.

John Tevis, President; Geo. M. Gilbert, Manager.

There was a squeeze in this mine which resulted in the loss of twenty or more of their working places and choked a number of the air-courses. Directions were given to improve the means of egress at the second outlet.

[This mine was inspected by A. G. Spillman on May 23d. Ventilation was defective, but timbering and drainage were satisfactory.]

WAVERLY COAL & MINING CO.

P. O., Waverly.

Transportation, I. C. Railroad.

W. T. Barker, President; John S. Payne, Superintendent.

Inspected three times during the year. Ventilation, timbering and drainage satisfactory at each inspection. The number of square yards of excavation requiring a second outlet had been made at this mine, and a second outlet was directed to be provided, which was being done at the date of the last inspection.

WEST KENTUCKY COAL CO.

P. O., Sturgis.

Transportation, I. C. Railroad.

Jas. T. Gardner, President; C. J. Bucher, Superintendent.

Colliery "B."—Ventilation was not entirely satisfactory throughout the mine. A number of places were driven more than 60 feet ahead of air. Drainage was not good on the Dip side of the shaft. Timbering not as good as it should have been.

Colliery "C."—Ventilation and other conditions of this mine fairly satisfactory.

[On February 23d *Colliery "C"* was examined by A. G. Spillman. The air current did not reach the working places. Sufficient attention was not paid to propping the rooms. Drainage was satisfactory.]

[Notes by A. G. Spillman for 1905.—The *Bell-Union mine* was inspected December 6th and found in a satisfactory condition in all respects. The *Cumberland mine* was examined May 24th. The air current was not conducted well enough to the working places. The *Davidson mine* was examined December 4th; a check curtain was needed on the Main entry between rooms 3 and 4 and a break-through was needed from room 2 to room 3. On December 6th an examination of the Sullivan mine of the *Marion Coal Co.* showed that ventilation was defective, the power of the furnace being insufficient. The air

shaft was not deep enough, and it was too near the crop. The Morganfield mine of the *Morganfield Coal & Mining Co.* was examined December 5th. Sufficient air was entering the shaft, but since break-throughs between rooms were too narrow and gob was piled in front of them, the current did not travel to the working places as it should have done. On December 5th an inspection of the *No. 9 DeKoven Mine* showed that a curtain was needed on the 4th Level between rooms 43 and 44, and a door on the Slope, between the Fourth and Fifth East levels. Other conditions were satisfactory. The American mine, operated by the *Southern Tidewater Coaling Co.* was inspected December 4th. Plenty of air for the number of persons underground was entering the mine, but it was not well conducted to the working places. Attention was called to the extra width entries were being driven. The *Thomas Coal Co.* struck coal in its shaft on December 19th. The *Waverly mine* was examined on December 4th. While enough air was entering the mine, it was not properly distributed. Written notice was given the company that the Main entry pillar of 18 feet is not thick enough. Collieries B. and C., of the *West Kentucky Coal Co.* were idle November, on account of a strike, and had been for some time.—A. G. Spillman.]

Webster County.

(Inspections and report by A. G. Spillman, Assistant Inspector.)

BLACKWELL MINE.

Head Office, Clay.

Transportation, Illinois Central Railroad.

Operated by the Thomas Blackwell Coal & Mining Co., C. R. Blackwell, President; C. R. Clark, Superintendent.

The coal is mined by two Harrison pick machines, power for which is furnished by one Norwalk compressor.

1905: Inspected November 26th.—All conditions were satisfactory, but since the mine has firedamp in it, certain rules and regulations were given to the company to follow. The company has abandoned No. 11 coal and has sunk to No. 9 coal. The Main entry, with air-course, had been started at the time of the inspection.

1906: Inspected June 29th.—All conditions satisfactory. The mine was subsequently abandoned and a new shaft sunk on the Morganfield & Atlanta railroad.

FAIRMONT MINE.

Heal Office, Providence.

Transportation, Kentucky Valley Railroad, and by connections with the Illinois Central.

Operated by the Fairmont Coal Co., Percy D. Berry, President; C. B. Jenkins, General Manager; George W. Beeson, Secretary. This mine was formerly a small one, operated for local purposes by W. E. Hess. It is on the Kentucky Valley railroad, about two miles from Wheateroft, and about seven miles from Providence. Side track, tipples, and other improvements were commenced in May; the first coal was loaded in the last days of June.

On October 4th, 1906, the ventilation and timbering were satisfactory, but drainage was not.

LACEY WRIGHT MINE.

Mine office, Providence.

Inspected June 30th.—Natural means were depended upon for ventilation. Written notice was served directing that air shaft be enlarged, and a furnace built.

Inspected Oct. 6th.—All conditions were satisfactory.

LUTON MINE.

Mine Office, Providence.

Transportation, Kentucky Valley Railroad; also by connection with Illinois Central Railroad.

Inspected June 30th.—Natural means were depended upon for ventilation, but an air shaft had been sunk, and a furnace was in the course of construction.

Inspected Oct. 6th.—Although the mine was in operation, there was no fire in the furnace. Written notice was served directing the company to fire the furnace each day the mine is operated.

PROVIDENCE MINES.

Mine Office and Head Office Providence.

Transportation, L. & N. Railroad.

Operated by the Providence Coal Co., W. A. Nisbet, President; W. J. Nisbet, Superintendent.

The company operates two mines, known as the Slope and the Shaft. About 51 per cent. of the coal is mined by machines. The plant includes one Westinghouse generator, and one Morgan-Gardner and four Jeffrey chain breast mining machines.

Slope Mine.—Transportation by Kentucky Valley Railroad; also by connection with the Illinois Central Railroad, and with the L. & N. Railroad.

1905: When inspected November 24th, the mine was in good condition.

1906: Two inspections were made. Sufficient air was entering the mine, but at neither time was the current kept within the legal distance of the working faces. On October 5th props were too far from the faces of several rooms.

Shaft Mine.—Transportation, L. & N. Railroad.

1905: When inspected November 24th the mine was in satisfactory condition.

1906: As a whole the mine has been maintained in a very good condition. Two inspections were made.

SEBREE MINE.

Both Mine and Head Office, Sebree.

Transportation, L. & N. Railroad.

Operated by the Sebree Coal & Mining Co., J. B. Ramsey, President; J. R. Ramsey, Vice President; C. H. Ramsey, Superintendent.

1905: Inspected November 28th.—The 3d, 4th, 5th, and 6th North entries on the West Side were very dry and dusty. Notice was served on the company to keep said entries sprinkled with water. On the East Side the ventilation was defective. Break-throughs were made too narrow.

1906: Inspected June 18th.—The airway leading from the bottom of the air shaft to the working parts of the mine

was choked with falls of slate, and the ventilation was defective. Drainage and timbering were satisfactory.

Inspected Oct. 23d.—Quite an improvement had been made in the airway from the bottom of the air shaft, but the ventilation was not yet satisfactory.

SHAMROCK MINE.

Mine Office, Providence; Head Office Earlington.

Transportation, L. & N. Railroad.

Operated by the St. Bernard Mining Co., John B. Atkinson, President; Geo. C. Atkinson, Secretary and Treasurer; Frank D. Rash, General Manager.

This mine has been maintained in an excellent condition in all respects throughout the year. Two inspections were made.

THOMAS WANLESS MINE.

Mine Office, Providence.

1905: Inspected November 24th.—Ventilation was defective, caused chiefly by the breaking of two rooms into the Providence Coal Co.'s. Slope, from which black damp came. Directions were given to close the two rooms, to sink a new air shaft and to build a furnace. Insufficient attention has been paid to propping rooms.

1906: Two inspections were made, and on each occasion I found the furnace cold, and the ventilation unsatisfactory. Sufficient attention was not given to the proper posting of rooms. Drainage satisfactory.

WEBSTER COUNTY MINE.

Office, Providence.

Transportation, L. & N. Railroad.

Operated by the Webster County Coal Company, D. B. Baker, President; F. M. Baker, Superintendent.

Inspected June 27th.—The drainage and timbering were satisfactory, but the ventilation was defective, in that the current did not serve the working places.

Inspected Oct. 3d.—Sufficient attention was not given to

the proper posting of the rooms. There was still cause for complaint from the failure to send the air to the working places.

WEST KENTUCKY MINES.

Mine Office, Wheatercroft; Head Office, Sturgis.

Operated by the West Kentucky Coal Co., James T. Garner, President; C. J. Bucher, Superintendent.

Colliery F.—

Transportation, Illinois Central Railroad.

This is a new mine, formerly known as the Rock Spring mine; only one inspection could be made. When the inspection was made, all work consisted of driving the Main entry and air course, and conditions were satisfactory.

Colliery G.—

Transportation, Illinois Central Railroad.

1905: When examined November 25th, ventilation and drainage were defective. Sufficient air was not entering, and such current as came was not properly conducted.

1906: Inspected June 28th.—The ventilation was defective, and there was too much both of mud and water on the Main entry roads. No lack of proper timbering observed.

Inspected Oct. 4th.—There were fourteen rooms on the Main West entry that were without ventilation. Ventilation elsewhere was satisfactory, but there was too much both of mud and water on the entry roads.

Colliery H.—

Transportation, Illinois Central Railroad.

1905: When visited in November, Colliery H. was idle. The company expressed an intention of sinking a slope, to do away with the shaft.

1906: Two inspections were made, in 1906. On each occasion ventilation, drainage and timbering were satisfactory.

THE MINING LAWS

IN EFFECT 1906.

AN ACT to provide for and regulate the ventilation of coal mines in this State and for the better protection of miners, enacted by the General Assembly of 1891-93, and amended at the sessions of 1894 and 1898.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: §1. First two sentences of Act of 1891-93 repealed by section 3 of Act of 1898, and the following substituted therefor: That the Board of Trustees of the State College be and they are hereby authorized to establish a course of study in said College to be known and designated as the "Course of Mining Engineering," in which shall be taught all the branches of science relating thereto, and said Board of Trustees shall, after the expiration of the terms of service of the present Inspector and assistants respectively, select, as other professors are selected, a suitable and competent person for Dean of the same, with the necessary staff of assistants, and said Dean shall by reason of said selection be the Inspector of Mines with all the powers and privileges now conferred upon said Inspector by law. It shall be his duty to determine, by chemical analysis or otherwise, the kind and quantity of the mineral products of the State of Kentucky as may be sent to him for inspection or analysis, and give written opinions thereon, but these latter duties shall not be allowed to interfere with his duties as Inspector, relative to the safe condition of the coal mines of the State. He shall take the required oath and give the same bond as now required by said officer. He and his assistants shall hold office on identically the same conditions with other professors in said College, and shall be subject to removal as

they are—From sec.3, chap. 55, Acts 1898. Act of 1906 designates said Inspector as Chief Inspector of Mines.]

Said Inspector shall have a practical knowledge of chemistry, geology and mineralogy, and shall also possess a practical knowledge of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of the mines, especially fire-damp, and he shall also have a practical knowledge of mining and engineering; and said Inspector shall, before he enters upon the discharge of his official duties, be sworn to discharge them faithfully and impartially, which oath shall be subscribed on his commission, and certified by the officer administering it, and his commission so indorsed shall be filed with the Secretary of State in his office; and said Inspector shall give bond in the penal sum of five thousand dollars, with surety, to be approved by the Governor, for the faithful discharge of his official duties.

§ 2. Said Inspector shall give his entire time and attention to the discharge of the duties of his office, and it shall be a part of his duty to visit and inspect, as often as may be necessary, all the coal mines in actual operation in Kentucky and to see that the provisions of this act are complied with by the owners, agents and superintendents of all the mines in this State.

§ 3. Said Inspector shall have power to visit and inspect any mine to which this act applies. He shall examine into the condition of such mine with respect to ventilation, drainage, timbering and general security; and if, upon inspection, he finds that such ventilation, drainage, or timbering as the health or safety of the persons employed in the mine would require has not been provided, or should he find the mine insecure in any part, or should he find that sufficient means of ingress and egress have not been provided, said Inspector shall at once notify the agent, superintendent or owner of the mine as to the unsafe or unwholesome condition of such mine, and require him to put the mine in a safe and wholesome condition, and such mine shall forthwith be rendered safe

and healthful. For a failure to comply with the directions of the Inspector to render such mine safe, and to provide such ventilation as is sought to be secured by this law, and to provide safe and suitable means of ingress and egress within twenty days from the date of inspection, the agent or superintendent and owner shall be liable to a fine of fifty dollars per day for every day that such mine shall be suffered to remain in such unsafe or unhealthful condition after the expiration of the twenty days above provided in which the required improvements should be made, which fine may be collected by indictment by the grand jury of the county in which such mine is situate; but in cases in which the Inspector is satisfied, from personal investigation, that, even if due diligence is observed, the required improvements can not be completed within the thirty (30) days above provided, he shall have authority to extend the time for not more than twenty days longer; but when the time is thus extended, the agent, superintendent or owner who is delinquent after the expiration of the additional time, shall be subject to indictment and fine as above provided; and as a cumulative remedy in case of failure of any owner, agent or superintendent to conform to the provisions of this law, after notice from the Inspector, within the time provided by this section, any circuit court, or judge in vacation, may, on application of the Inspector, by civil action, in the name of the State, enjoin or restrain, by writ of injunction, the said owner or agent or superintendent from working or operating such mine with more than five persons until it is made to conform with the provisions of this law. But before such writ of injunction shall issue, the owner, agent or superintendent shall have at least three days' notice of such contemplated action, and shall have the right to appear before such court, or the judge in vacation to whom the application is made, who shall hear the same on affidavits and such other testimony as may be offered in support, as well as in opposition thereto. It shall be the duty of the Commonwealth's attorney of the district, and of

the lines of all adjoining lands, and the name or names of each owner or owners so far as known, marked on each tract; a true copy of which map the said owner, agent, lessee or superintendent shall deposit with the Inspector of Mines within seventy days after said first day of January, and another copy of which shall be kept at the office of such mine. But, after the making of and filing with said Inspector of the first map of the mine, as required herein, the owner, agent, lessee or superintendent, shall only be required to annually make and file with said Inspector, within the times herein specified, such additional map and statement as may be necessary to truly show the progress of the workings and the amount of excavation of said mine from the date of the preceding map or survey up to the first day of January as provided herein. The Inspector shall annually, on or before the first day of January, give warning notice that said map is required; and upon the refusal or failure of the agent, owner, lessee or superintendent receiving such notice, to make, or cause to be made, such map within sixty (60) days, and deposit the same with the Inspector within seventy (70) days, specified herein, said owner, agent, lessee or superintendent shall be liable to a fine of five dollars (\$5) a day for each day elapsing until said map is made, said fine to be recovered in the county in which the mine to be mapped is situated. The correctness of each map provided for by this section shall be certified to by the person making such map; and the Inspector may reject any map as incomplete, the accuracy of which is not so attested.

§ 9. It shall not be lawful for the owner, agent or superintendent of any coal mine, worked by shaft, slope or drift, wherein fifteen thousand square yards have been excavated, to employ more than ten persons to work therein, or to permit more than ten persons to work in such mine, unless there are to every seam of coal worked in each mine at least two separate outlets, separated by natural strata of not less than one hundred feet in breadth, by which shafts or outlets distinct means of ingress and egress are always available

to the persons employed in such mines; but it shall not be necessary for the two outlets to belong to the same mine; and every shaft opened after the passage of this act shall have two such separate outlets after fifteen thousand square yards shall have been excavated; and to all other mines, whether slopes or drifts, two such openings or outlets shall be provided within twelve months after the passage of this law, provided fifteen thousand square yards have been excavated at or before the passage of this law, or if not, then within twelve months after that extent has been excavated. In case any coal mine has but one shaft, slope or drift for the ingress or egress of the men working therein, and the owner thereof does not own suitable ground for another opening, such owner may select appropriate associate adjacent surface ground for that purpose, and have the same condemned, and appropriate the same by proceedings in the county court of the county where the mine is situated, similar to proceedings now allowed by law for securing a private passway.

§ 10. The owner, agent, or lessee of every coal mine, whether slope, shaft or drift to which this act applies, shall provide and maintain for every such mine an amount of ventilation of not less than one hundred cubic feet of air per minute per person employed in such mine, which shall be circulated and distributed throughout the mine in such a manner as to dilute, render harmless, and expel the poisonous and noxious gases from each and every working place in the mine, and no working place shall be driven more than sixty feet in advance of a break-through or air way; and all break-throughs or air ways, except those last made near the working face of the mine, shall be closed up and made air-tight by brattice, trap doors, or otherwise, so that the currents of air in circulation in the mine may sweep to the interior of the excavations where the persons employed in the mines are at work; and all mines governed by this statute shall be provided with artificial means of producing ventilation, such as suction or forcing fans, exhaust steam, furnaces, or other contrivances of such like capacity and power as to produce and maintain

an abundant supply of air. All mines generating fire-damp shall be kept free from standing gas, and every working place shall be carefully examined every morning with a safety lamp, by a competent person or persons, before any of the workmen are allowed to enter the mine. And at every mine operated by a shaft there shall be provided an approved safety-catch, and a sufficient cover overhead, on all cages used for lowering and hoisting persons, and at the top of every shaft a safety-gate shall be provided, and an adequate brake shall be attached to every drum or machine used in lowering or raising persons in all shafts and slopes.

§ 11. Any person employed in any mine governed by this statute who intentionally or willfully neglects or refuses to securely prop the roof of any working place under his control, or neglects or refuses to obey any order given by the superintendent of the mine in relation to the security of that part of the bank where he is at work and whoever knowingly and willfully does any act endangering the lives or health of the persons employed in a mine or the security of the mine or machinery, shall be liable to a fine of not less than ten dollars nor more than fifty dollars, to be recovered in the county in which the mine is situate.

§ 12. Coal mines in which not more than five persons are employed at one time shall be exempt from the provisions of this law.

§ 13. On account of the emergency hereby declared to exist, in that it is necessary for the employes in mines to receive the protection of the provisions of the law in timely season, this law shall be in force from its approval by the Governor.

Approved February 15, 1893.

CURATOR OF GEOLOGICAL DEPARTMENT.

EXTRACT from Resolution 61 of General Assembly of 1891-92-93, as amended in Chapter 78 of Acts of General Assembly of 1894.

§ 1. That the Inspector of Mines, in addition to his duties as such Inspector, shall be Curator of the Cabinet and other property of the Geological Survey or Department, and all the records, documents, collections, instruments, apparatus, books, maps and other property of the Survey are hereby confided his care and keeping; and, as such Curator, he is hereby required to attend to all correspondence and respond to all requests concerning the mineral resources of the State that come to him in said capacity; to attend to the distribution of all published maps and reports in his hands intended for distribution, and to perform all the duties usually devolving upon such Curator, so far as is applicable in this case; and he shall whenever the General Assembly shall direct and provide therefor, cause to be printed under his supervision, any or all of the unpublished reports of the Geological Survey that may be in his custody. He shall be allowed and paid fifty dollars per month as compensation for his services as such Curator, and shall give bond for the faithful performance of his duties as such Curator, with surety to be approved by the Governor. [By Acts of 1904 and 1906 the Curator is designated as Director of the State Geological Survey.]

ASSISTANT INSPECTOR.

AN ACT to increase the efficiency of the Inspector of Mines, and more fully provide for the protection of the lives and health of persons employed in the coal mines of this State, enacted by the General Assembly of 1891-92-93, and amended by Act of 1898.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. Every mine subject to the provisions of the act providing for the inspection of the coal mines, shall be inspected not less than three times each year, the inspection to be, as nearly as possible, not more than four months apart, and as many more times as the facilities of the office will permit.

[§ 2. One Assistant Inspector is selected by the Board of Trustees of the State College of Kentucky.] Said Assistant Inspector shall have a practical knowledge of the different systems of working and ventilating coal mines, and of the nature and properties of the noxious and poisonous gases of mines, especially fire-damp, and he shall also have a practical knowledge of mining. Said Assistant Inspector shall before entering upon the discharge of his official duties be sworn to discharge them faithfully and impartially, which oath shall be subscribed on his commission and certified by the officer administering it, and his commission so indorsed, shall be filed with the Secretary of State in his office, and said Assistant Inspector shall give bond in the penal sum of two thousand dollars, with surety, to be approved by the Governor, for the faithful discharge of his official duties.

§ 3. Said Assistant Inspector shall give his entire time and attention to the duties of his office, which shall consist of aiding, under the direction of the Inspector of Mines, in carrying out the provisions of this and all other acts relating to the inspection of coal mines.

§ 4. Such Assistant Inspector, while in office, shall not act as

agent or as manager or mining engineer for, or be interested in operating any coal mine in this State. He shall receive an annual salary of \$1,200 (twelve hundred dollars), payable monthly, and shall likewise be allowed and paid his necessary traveling expenses when absent from his office on business connected with his department. He shall have his office with the Inspector of Mines, and shall keep a record of all inspections made by him, and make a monthly report of the same to the Inspector of Mines for said Inspector's use when preparing his annual report.

§ 5. (As amended and approved June 9, 1893.) For the reason that the number of mines in this State, subject to the law requiring inspection is now so great that it is impossible for one person charged with the duties of Inspector of Mines to give all of them the immediate, detailed and frequent attention they require, and, in addition, discharge the other duties of his office, an emergency is hereby declared to exist, and this act shall be in force from its approval by the Governor; but the term of said Assistant Inspector of Mines provided for herein, and his salary, shall begin only with the date of his appointment.

ADDITIONAL ASSISTANT INSPECTORS—MINERS' OIL
LAW—INSPECTION OF MINE SCALES—INSTRUMENTS TO BE PROVIDED.

CHAPTER 108, ACTS OF GENERAL ASSEMBLY OF 1906.

AN ACT to increase the efficiency of the office of Inspector of Mines and afford greater protection to the lives and health of persons employed in the coal mines of this State, and to provide for the inspection of mine scales and miners' oil.

WHEREAS, The number of coal mines in Kentucky has increased very largely within recent years, and is still rapidly increasing, so that it is physically impossible for the office of Inspector of Mines, with its present inadequate inspection force, to fully carry out the provisions of the law relating to the inspection of the coal mines of this State; therefore,

Be it enacted by the General Assembly of the Commonwealth of Kentucky:

§ 1. In order that the efficiency of the office of Inspector of Mines may be increased, so that the provisions of the law relating to the inspection of coal mines may be more fully carried out and the greater protection afforded the lives and health of persons employed in the coal mines of the State, the Governor is hereby authorized and directed to appoint two additional Assistant Inspectors of Mines, who shall hold office for four years and until their successors are appointed and qualified. Said Assistants shall have a thorough knowledge of the different systems of working and ventilating coal mines and of the nature and properties of mine gases, especially of explosive gas, and shall have a thorough and practical knowledge of mining gained by at least five years experience at and

in such mines. Said Assistant Inspectors, before entering upon the discharge of their official duties, shall be sworn to discharge them faithfully and impartially, which oath shall be certified by the officer administering it, and said certificate shall be filed with the Secretary of State in his office and each of said Assistants shall give bond in the penal sum of two thousand dollars, with surety to be approved by the Governor, for the faithful discharge of his official duties. Each of said Assistants shall give his entire time and attention to the duties of his office, which shall consist of aiding, under the direction of the chief Inspector of Mines, in carrying out the provisions of this act and of all other acts relating to the inspection of mines. He shall keep a record of all inspections made by him and make monthly report of the same to the chief Inspector, and he shall at all times in all things pertaining to the duties of his office be subject to the orders of the chief Inspector. Said Assistants shall not be interested in operating any mine in this State, and they shall each be liable to dismissal for willful neglect of duty or malfeasance in office. Each Assistant Inspector shall receive an annual salary of twelve hundred dollars, payable monthly, and shall likewise be allowed and paid his necessary traveling expenses when engaged in the discharge of his official duties.

§ 2. In order that the work of inspection of the mines may be systematized and expedited, the State is hereby divided into two inspection districts, the main line of that division of the Louisville and Nashville railroad, which extends from Louisville, Kentucky, to Nashville, Tennessee, being the division line between them. That part of the State west of the said railroad line shall be known as the First, or Western, District, and that part east of said line shall be known as the Second, or Eastern District. But, whenever he may deem it advisable to do so, the Chief Inspector of Mines may divide the Eastern District into two districts, thus making three inspection districts in all. One of the Assistant Inspectors shall reside in the Western District and have as his especial assignment the inspection

of the coal mines thereof; one shall reside in and have as his especial work the inspection of the coal mines of the Eastern, or Second District; and one shall work in both districts, as the Chief Inspector may direct. Whenever the Chief Inspector may deem it expedient to divide the Second District into two districts, he shall assign one of the Assistant Inspectors to work in the third district resulting therefrom, so that each of the three Assistant Inspectors (the two additional ones herein provided for and the one already provided for by law) shall have charge of a district; but all the Assistants shall be subject to the rules and regulations laid down by the Chief Inspector for the general conduct of the office of Inspector of Mines, and whenever the Chief Inspector may deem it necessary, in the interest of efficient supervision of the mines, to temporarily employ the services of two or of all three Assistants at the same time in one and the same district, or whenever he may deem it desirable in the interest of efficient inspection to temporarily change Assistants from one district to another, he shall have authority to do so.

§ 3. The owner, agent or operator of every coal mine in this State at which the miners are paid by weight shall provide at such mines suitable and accurate scales for the weighing of the coal for which the miners are to be paid; and when differences arise between the owner, agent or operator of the mine and the miners employed in the same as to the accuracy or capacity of the scales, the question shall be referred to the Chief State Inspector of Mines, whose duty it shall be to inspect and test said scales in person or by an Assistant Inspector of Mines, as early as practicable after receiving notification; and should said Inspector find the scales inaccurate or defective beyond the limit admitted in scales of standard manufacture, he shall notify the owner, agent or operator of the mine and said scales shall forthwith be repaired and made accurate or accurate scales substituted therefor. Any owner, agent or operator of a coal mine who refuses or fails to comply with instructions to render his mine scales accurate shall be guilty of a

misdemeanor and, on conviction, shall be fined not less than five dollars nor more than fifty dollars.

§ 4. All mines known to generate fire-damp or explosive gas shall, as nearly as practicable, be inspected every sixty days; and the Chief Inspector of Mines is hereby directed to procure the most efficient and modern appliances and instruments, including a Shaw or other equally efficient gas tester, for detecting and estimating the amount of explosive gas in the mines, the same to be paid for upon the order of the Inspector, approved by the Governor, and they shall be the property of the State.

§ 5. It shall be unlawful for any person, firm or corporation, or any agent, or employe of same, to sell or furnish any oil to be used for illuminating purposes in coal mines in this State, unless the same shall have been inspected, approved and certified as hereinafter provided and any person, firm or corporation, or the agent or employe of same violating the provisions of this section, shall be guilty of a misdemeanor and fined not less than ten nor more than fifty dollars for the first offense; and for each subsequent offense shall be fined not less than fifty dollars nor more than one hundred dollars.

§ 6. It shall be the duty of the State Inspector of Mines, in person or by an Assistant Inspector of Mines, to inspect all miners' oil or equivalent material used for illuminating purposes in coal mines, and when said oil complies with the requirements and tests of the seventh section of this act, he shall stencil, or otherwise plainly mark, each barrel, cask or package in which it is contained substantially as follows: "Approved this-----day of-----by Inspector-----," the blanks to be filled out with the date and name of the Inspector making the inspection; but if the oil does not come up to the said requirements and tests, the barrel, cask or package shall be so marked substantially as follows: "Rejected for illuminating purposes in the coal mines of the State of Kentucky this-----day of-----by Inspector-----," the blanks to be filled out with the date and name of the person making the inspection. A record shall be kept

in the office of the chief Inspector of Mines, showing the number of barrels or other packages or gallons inspected, whether approved or rejected, and giving date, place of business and name of the person, firm or corporation for whom the inspection was made.

§ 7. The requirements and tests which will authorize the approval provided for in the preceding section are as follows: It shall be a pure animal or vegetable oil or other material as free from smoke and bad odor and of equal merit as an illuminant as pure animal or vegetable oil, and not the product or by-product of rosin. The oil must be tested at sixty degrees Fahrenheit. Its specific gravity must not exceed twenty-four degrees Tagliabue. The test must be made in a glass jar one and five tenths inches in width and seven inches in depth. Should the oil to be tested be below forty-five degrees Fahrenheit in temperature, it must be heated until it reaches eighty degrees Fahrenheit; and should the oil be at or over forty-five degrees Fahrenheit, but below sixty degrees, it must be raised to a temperature of seventy degrees Fahrenheit, and then, after being well shaken, it is to be allowed to cool gradually to a temperature of sixty degrees Fahrenheit before finally being tested. In testing the gravity of the oil, the Tagliabue hydrometer must be, when possible, read from below, and the last line which appears under the surface of the oil shall be regarded as the true reading. Should the oil be opaque or turbid, one-half of the capillary attraction shall be deemed and taken as the true reading. When the oil is tested under difficult circumstances, an allowance of one-half a degree may be made for possible errors in parallax before condemning the oil for use in the mine. All oil or other material used for illuminating purposes in mines shall be contained in barrels, casks or packages branded conspicuously with the name of the dealer, the specific gravity and date of shipment.

§ 8. The inspection herein provided for shall be made at all reasonable times and places on request of any person, firm or corporation engaged in selling or furnishing illuminating oil for use in the coal mines of this State.

§ 9. Any person using any barrel, cask or package marked with the Inspector's approval for the storage of any other oil than that which was contained therein at the time said barrel, cask or package was so marked, shall be guilty of a misdemeanor and punished as provided in the fifth section of this act.

§ 10. There shall be provided for the office of Inspector of Mines all the instruments and appliances necessary for carrying out the provisions of this act, which shall be paid for on the order of the Chief Inspector, approved by the Governor, and which shall belong to the State.

§ 11. On account of the nature of the work to be carried on under this act, and the importance that its benefits shall be received by those employed in the mines at an early day, an emergency is hereby declared, and this act shall take effect upon its approval by the Governor.

Approved March 21, 1906.

TO PROVIDE FOR A CHECK-WEIGHMAN.

CHAPTER 1251 of Acts of General Assembly of 1885-86.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. That when a majority of the miners engaged in digging or mining coal in any coal mine in this State, at which as many as twenty men are employed, request the owner or owners, or operator or operators, of any of said mines to allow said miners to employ, at their own expense, a person to inspect the scales at said mine, and see that all the coal digged and mined by said miners is properly weighed and accounted for, and do and perform such other duties as will insure that said coal is properly weighed and correctly accounted for, said owner or owners, or operator or operators, shall permit such person to be employed by said miners making the request. Provided, the person so employed has the reputation of being an honest, trustworthy, discreet and upright man. The appointment, under the provisions of this act of each inspector and assistant weigher, shall be approved by the judge of the county court of the county wherein the same is made.

§ 2. The person appointed and employed by miners to perform the duties set forth in the first section of this act shall, at all times, have free access to the scales at the mines, and the said person so employed by the miners shall not be hindered or prevented from a proper performance of his duties by the person who weighs coal for the operator or operators of any mines, nor any of the agents or employes of said operator or operators. Said person employed by the miners shall in no way prevent the weighman or other employes of said operator or operators from performing their duties in a proper manner.

§ 3. Any person violating any of the provisions of this act shall be fined not less than ten nor more than fifty dollars, and each day on

which any of the provisions of this act is violated shall constitute a separate offense.

§ 4. This act shall take effect and be in force from and after its passage.

Approved May 18, 1886.

[By oversight this law was omitted from the Kentucky Statutes compiled by Barbour & Carroll, 1894.]

ROADS FROM MINES.

SECTION 815, Kentucky Statutes, 1894.

§ 815. Any person engaged in operating a mine or stone quarry within three miles of any navigable stream or railroad may, for the purpose of transporting materials to and from such stream or railroad, and such mine or quarry, construct and operate a line of railroad from such mine or quarry, to the most convenient and accessible point on such stream or road, and may, under the general laws, condemn such land as may be necessary, not exceeding fifty feet in width for each track necessarily constructed, and not exceeding two acres of land at such railroad or stream for the purpose of necessary buildings. The owner or operator of such roads shall be, so far as they are applicable, governed and controlled by the laws relating to other railroads, and shall have the same rights and privileges granted to corporations owning and operating lines of railroad.

WAGES—PAYMENT IN MONEY—STATUTORY REQUIREMENT—CONSTRUCTION.

KENTUCKY STATUTES, Chapter 36, Section 1350—Wage-earners—
Penalty for Not Paying in Money.

That any corporation or person or persons having the ownership or control of any factory, mine or workshop in this Commonwealth, who shall violate the provisions of Sec. 244 of the Constitution, reading as follows: "All wage-earners in this State employed in factories, mines, workshops, or by corporations shall be paid for their labor in lawful money," shall be guilty of a misdemeanor, and, on trial and conviction, had in any court of competent jurisdiction, shall be fined not exceeding five hundred dollars for each violation thereof.

KENTUCKY STATUTES, Chapter 36, Section 1386—Notes of Incorporated Banks Only to be Circulated.

It shall not be lawful to make, offer to pay, or to pass or offer to pass any note, bill, order or other thing passing by delivery, as a circulating medium, in lieu of or as the representative of money, unless it be the note or bill, of not less than five dollars, of some banking institution legally incorporated in the United States, or currency of the United States. If a note, bill, order or other such thing, be of the denomination of less than five dollars, it shall be presumed to have been made, paid or passed, or offered in violation of this section unless the contrary be shown.

CONSTRUCTION.

Case in Point.—The Avent Beattyville Coal Co., Lee county, was convicted of not paying its wage-earners in lawful money, and appealed. Reversed.

In Brief.—A mining company paid its employes once each month in lawful money for the past month's labor, and at any time during the month, upon their application, issued checks to them, payable in merchandise at the company's store. The amount of checks so issued to each man was deducted from his wages on every pay-day and he was paid the balance in cash, but no money paid for outstanding checks. Held—That such arrangement was not in violation of Constitution, Section 244, and Stats. of Ky., Section 1350, providing that wage-earners shall be paid for their labor in lawful money. (Opinion delivered by Judge Hazelrigg, December 1, 1894. Published in full in Report for 1894.)

WAGES—WHEN TO BE PAID—COMPANY STORE.

CHAPTER 15, Acts of General Assembly of 1898.

AN ACT concerning employes and servants in mining work or industry in this Commonwealth.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. That all persons, associations, companies and corporations employing the services of ten or more persons in any mining work or mining industry in this Commonwealth, shall on or before the sixteenth day of each month pay for the month previous such servant or employe on his or their order in lawful money of the United States the full amount of wages due such servant or employes rendering such services. But if such person, corporation or company, after using due diligence, is unable to make said payment as above required he or it shall within fifteen days thereafter make out a payroll and statement of amount due each employe and also a due bill for said sum bearing interest from said sixteenth day of the month, and deliver same to each of said employes.

§ 2. It shall be unlawful for any person or persons, association, company, or corporation employing others, as described in section one, either directly or indirectly, to coerce or require any such servant or employe to deal with or purchase any article of food, clothing or merchandise of any kind whatever, from any person, association, corporation or company, or at any place or store whatever. And it shall be unlawful for any such employers as described in the first section to exclude from work or to punish or blacklist any of said employes for failure to deal with any other or to purchase any article of food, clothing or merchandise whatever from any other or at any place or store whatever.

§ 3. Any person or persons, company or corporation described in the first section that shall violate any of the provisions of this act

shall be guilty of a misdemeanor and on conviction shall be fined not less than fifty dollars nor more than one hundred dollars for each offense, and the doing or failure to do any act or thing required by this act shall constitute a separate offense.

Received by the Governor, March 2, 1898.

Became a law at the expiration of ten days without the Governor's approval.

CHILD LABOR LAW.

CHAPTER 16, Act of General Assembly of 1902.

An act to make it unlawful to employ a child less than fourteen years of age in workshops, mines, mills or factories in this Commonwealth and fixing a penalty

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. That it shall be unlawful for a proprietor, foreman, owner or other person to employ any child less than fourteen years of age in any work-shop, factory or mine, in this State; that unless said proprietor, foreman or owner shall know the age of the child, it shall be his or their duty to require the parent or guardian to furnish a sworn statement of its age, and any swearing falsely to such by the parent or guardian, shall be perjury and punishable as such. Provided, That if the parent or guardian and the County Judge of any county may consent in writing for such employment, then in that event such employment may be made, subject to the approval of the County Attorney of said county, in the event of any complaint, and if he thinks after investigation of such complaint that it is against the best interests or moral welfare of such infant child he may so notify said employee and then this act applies as if no consent was given.

§ 2. That any proprietor, foreman or owner employing a child less than fourteen years of age in conflict with the provisions of this Act, except where such proprietor, foreman or owner has been furnished with a sworn statement of guardian or parent that the child is more than fourteen years of age, shall be guilty of a misdemeanor, and upon conviction, shall be fined not less than twenty-five dollars and not more than two hundred and fifty dollars.

§ 3. That the grand jury shall have inquisitorial powers to investigate violations of this Act, and that Judges of the Circuit courts

of the State shall specially charge the grand jury at the beginning of each term of the court to investigate violations of this Act.

§ 4. That this Act shall take effect ninety days after the adjournment of this General Assembly. Approved March 12, 1902.

AMENDMENT TO CHILD LABOR LAW OF 1902.

CHAPTER 52, Acts of General Assembly of 1906.

AN ACT to amend an act, entitled "An act to make it unlawful to employ a child less than fourteen years of age in workshops, mines, mills or factories," and to regulate the employment, use and protection of child labor in mills, factories, etc.

Be it enacted by the General Assembly of the Commonwealth of Kentucky: § 1. No child under sixteen years of age, employed in any manufacturing establishment, mine, mill or workshop in this Commonwealth, shall be required, permitted or suffered to work therein more than sixty hours in any one week, nor more than ten hours in any one day, unless for the purpose of making a shorter work day on any one day of the week, and in no case shall any child under sixteen years of age work in any manufacturing establishment, mine, mill or work-shop after seven o'clock in the evening or before six o'clock in the morning of any day; and every person, firm, corporation or company employing any child under sixteen years of age in any manufacturing establishment, mine, mill or work-shop shall post, and keep posted, in a conspicuous place in the office, a printed notice, stating the number of hours of labor per day required of such persons for each day of the week, and the number of hours of labor exacted or permitted to be performed by such persons shall not exceed the number of hours of labor so posted as being required. The time of beginning and ending of the day's labor shall be the time stated in such notice.

§ 2. No child under fourteen (14) years of age shall be employed at any time in any factory, workshop, mill or mine, unless said child shall have no other means of support. No such child shall be employed in any mercantile establishment, nor in any service of any telegraph, telephone or public messenger company, laundry, printing establishment, except during the vacation of the public schools. No child under sixteen (16) years of age shall be employed at any occupation dangerous or injurious to health or morals.. And in event of disagreement between the Labor Inspector and proprietor, the city or county physician shall be called in as referee, and his decision shall be final. It shall be the duty of every person employing children to keep a register in which shall be recorded the name, birth-place, age and place of residence of every person employed by him under the age of sixteen years; and it shall be unlawful for any proprietor, agent, foreman or other person in or connected with a manufacturing establishment, mine, mill or workshop to hire any child under the age of sixteen years to work therein without there is first provided and placed on file in the office an affidavit made by the parent or guardian, stating the age, date and place of birth of said child. If said child has no parent or guardian, the said affidavit shall be made by the child, which affidavit shall be kept on file by the employer, and said register and affidavit shall be produced for inspection on demand by the Labor Inspector. There shall be posted conspicuously in every office of every factory, mill, workshop or mine, where children under sixteen years of age are employed, a list of their names, with their ages, respectively. The Labor Inspector shall have the power to demand a certificate of physical fitness from the city or county physician in the case of children whom he deems physically unable to perform the labor at which they may be employed, and shall have the power to prohibit the employment of any child that cannot obtain such certificate.

§ 3. No person, firm or corporation shall employ or permit any child under the age of sixteen years to have the care, custody, manage-

ment of, or to operate any elevator, nor shall any person under sixteen years of age be employed at sewing belts or assist in sewing belts.

§ 4. It shall be the duty of any owner of any manufacturing establishment, or his agents, superintendents or other persons in charge of the same, to furnish and supply, when practicable, or cause to be furnished and supplied therein, belt shifters, or other safe mechanical contrivances for the purpose of throwing belts on or off pulleys; and, whenever practicable, machinery therein shall be provided with loose pulleys. All vats, pans, saws, planes, cogs, gearing, belting, set screws and machinery of every description therein, which is palpably dangerous, where practicable, shall be properly guarded, and no person shall remove or make ineffective any safeguard around or attached to any planer, saw belting, shafting or other machinery, or around any vat or pan, while the same is in use, unless for the purpose of immediately making repairs thereto, and all such safeguards shall be properly replaced. No person under eighteen years of age shall be allowed to clean machinery while in motion.

§ 5. Suitable and proper wash rooms and water closets shall be provided in each manufacturing establishment, and such water closets shall be properly screened and ventilated and be kept at all times in a clean condition; and if women and girls are employed in any such establishment, the water closets shall have separate approaches and be separate and apart from those used by men. All closets shall be kept free from obscene writing and marking. A dressing room shall be provided for women and girls when required by the Labor Inspector in any manufacturing establishment in which women and girls are employed.

§ 6. Every person, firm, corporation, association, individual or partnership employing girls or adult women in any manufacturing, mechanical or mercantile industry, laundry, workshop, renovating works or printing office in this Commonwealth shall provide seats for the use of the girls and women so employed, and shall permit the

use of such by them when not necessarily engaged in the active duties for which they are employed.

§ 7. The walls and ceilings of each room in every manufacturing establishment shall be lime washed or painted, when, in the opinion of the Labor Inspector, it shall be conducive to the health or cleanliness of the persons working therein.

§ 8. That the grand jury shall have inquisitorial powers to investigate violations of this act, and that judges of the circuit courts of the State shall specially charge the grand jury at the beginning of each term of the court to investigate violations of this act.

§ 9. The words "manufacturing establishment," wherever used in this act, shall be construed to mean any mill, factory or workshop where labor is employed.

§ 10. A copy of this act shall be conspicuously posted and kept posted in each work room of every manufacturing establishment, mill, mine or workshop in this Commonwealth.

§ 11. Any person who violates any of the provisions of this act, or who suffers or permits any child to be employed in violation of its provisions, shall be deemed guilty of a misdemeanor and, on conviction, shall be punished by a fine of not more than fifty dollars for the first offense and not more than two hundred dollars for the second offense.

§ 12. The provisions of this act shall not apply to the handling of fruits and vegetables in season, and the delivery of tobacco at the warehouses, and preparing same for the manufacturer.

§ 13. All laws and parts of laws in conflict with the provisions of this act are hereby repealed.

Approved March 17, 1906.