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BEFORE THE UNITED STATES ANTHRACITE
COAL COMMISSION

EMPLOYES EXHIBIT NUMBER _____

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IRREGULARITY OF EMPLOY-
MENT IN THE ANTHRACITE
INDUSTRY

Presented by
W. JETT LAUCK

On behalf of
John L. Lewis, President
Philip Murray, Vice-President
F. P. Hanaway, International Representative
Percy Tetlow, Statistician

John Dempsey } Committee Representing
Thomas Kennedy } Districts 1, 7 and 9
Chris. J. Golden }

Of the
United Mine Workers of America

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WASHINGTON
1920

This exhibit was prepared under the
supervision of
W. JETT LAUCK
by Leland Olds

No. of D.
AUG 24 1920

**BEFORE THE UNITED STATES ANTHRACITE
COAL COMMISSION**

EMPLOYES EXHIBIT NUMBER _____

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INDUSTRY**

UNITED STATES DEPARTMENT OF COMMERCE
BUREAU OF COAL
WASHINGTON, D. C.

Presented by

W. JETT LAUCK

On behalf of

United Mine Workers of America

WASHINGTON

1920

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IRREGULARITY OF EMPLOYMENT IN THE ANTHRACITE INDUSTRY

GENERAL SURVEY.

In the coal mining industry the degree of regularity of operation is today as important a factor in earnings as is the level of hourly rates. As the industry operates on part time basis, the health of the family depends upon annual earnings, which are the product of the hourly rate by the number of hours of actual employment. In determining rates of pay, therefore, it is important to form an estimate as to the probable number of days during which the worker will have an opportunity to earn the rate set.

Data are available as to the number of days worked in the anthracite industry covering the period since 1881. During this period the variation has been very great. This variation is shown graphically on the accompanying table. The greatest number of days worked was 293 in the abnormal year 1918, while 1902, the year of the great anthracite strike, shows only 116 days of operation. For more normal years the greatest number of days worked was 257, in 1913, while the lowest point came in 1897, with only 150 days of operation.

A careful examination of the data presented in this report would seem to point to the following general conclusions in regard to the anthracite coal industry:

(1) The anthracite mine workers have suffered more from irregularity of employment than have the bituminous mine workers. Not only is the average number of working days in anthracite lower than in bituminous mines, but the extremes are greater.

During the period since 1881 the anthracite workers have had an opportunity to work on an average only 212 days out of each year. This means 92 days of idleness, 30 per cent of the working year, during which they have no opportunity to earn a living wage. In obtaining this average the abnormally low figure for 1902 due to the protracted strike has been left out, but the abnormally high figures for 1917 and 1918 have been included. Were the figure for 1902 included, the average for anthracite would be even lower.

This average, 212 working days, compares with 229 days of operation in the bituminous mines of Pennsylvania, and with 216 in those

of the entire country. The bituminous figures represent averages for the period since 1892. If figures for the same period for anthracite had been averaged, the days worked would be found to be 210. Comparison with Pennsylvania bituminous is fairer because all the anthracite fields of major importance are in that State.

(2) Shortage of labor does not enter appreciably into this problem of a part-time industry, the chief difficulty having been over-supply of labor as well as of capital. The sufferings of the workers from unemployment may be directly traced to a bad policy of investment during the days of unregulated competition. This has not only injured the worker, but has also rendered high prices unavoidable.

(3) The problem of car shortage as a cause of irregularity, so much in evidence in the bituminous industry, has played so small a role in the anthracite industry as to be almost negligible.

(4) The fundamental cause of irregularity has been "no market." In other words, the equipment and labor force have been more than adequate to produce the supply which the market has been ready to absorb. The anthracite market has become primarily that of a domestic fuel. The determining factors in this market are, therefore, weather and growth of population. Other fuels are beginning to compete with anthracite in its own domestic sphere. In order to estimate the probable number of days which will be averaged in future years, it will be necessary to form a judgment as to the probable future of the market in relation to possible production. From this and from data for the last decade it would appear that the market for anthracite in the future will remain in a state of equilibrium at about the level for the years 1910 to 1916, inclusive. In other words, growth of population seems to be about balanced by the increasing competition of other fuels.

(5) This will mean that the maximum average days per year which may fairly be expected will be about 242, leaving the worker to face unemployment for 20 per cent of the working year. From the consideration of other factors, discussed more at length in the following pages, this would appear to be a conservative estimate, the probability being that there will be more idle days rather than less.

(6) It is probable that had there not been overinvestment in the anthracite industry, the problem could have been met by reducing the hours of labor without adding to the present price of anthracite coal.

I.

NUMBER OF DAYS WORKED IN COAL INDUSTRY,
1881 TO 1919.

The following table affords a comprehensive survey of the entire problem. It will serve as a guide to the subsequent tables which consider the problem in greater detail.

The data for this table are taken from Bulletin 115 of the Department of the Interior, Bureau of Mines, Tables 124 and 126, supplemented by material in the annual report on coal in the "Mineral Resources of the United States" and in recent reports of the United States Geological Survey.

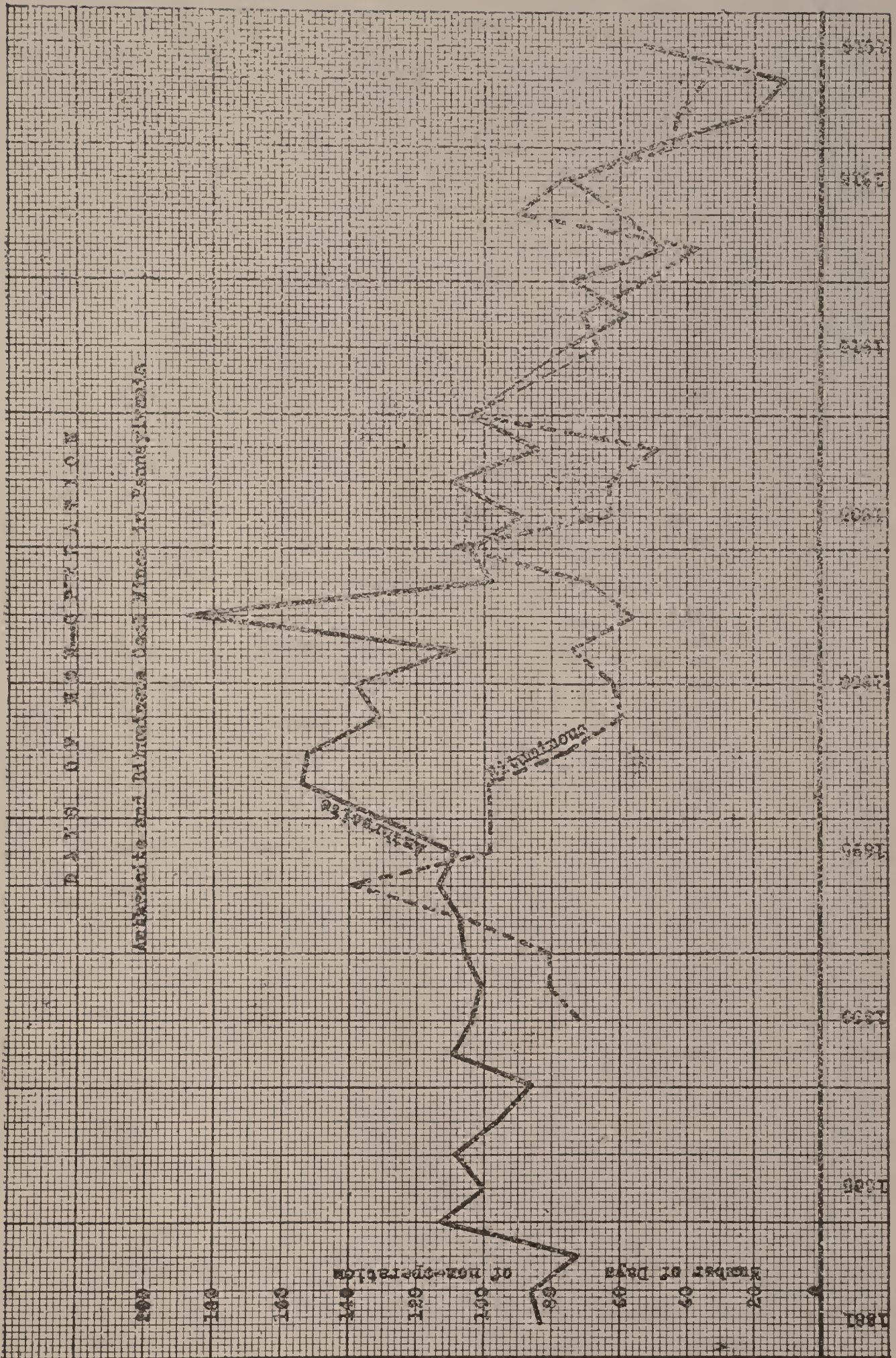
DAYS WORKED IN THE ANTHRACITE COAL INDUSTRY, TOGETHER WITH
OTHER DATA FOR COMPARISON.

Year.	Anthracite.			Bituminous.		
	No. men employed.	—Av. tonnage per man— day. year.		Days worked.	—Days worked— Penna. U. S.	
1881.....	76,031	1.90	420	221	...	...
1882.....	82,200	1.96	427	218	...	...
1883.....	91,421	1.81	421	232	...	...
1884.....	101,073	1.92	368	192	...	...
1885.....	100,324	1.87	382	204	...	...
1886.....	103,044	1.93	379	196	...	...
1887.....	106,517	1.90	395	208	...	...
1888.....	122,218	1.75	381	218	...	...
1889.....	123,676	1.90	368	194	...	...
1890.....	126,000	1.85	369	200	232	226
1891.....	126,350	1.98	401	203	223	233
1892.....	129,050	2.06	407	198	223	219
1893.....	132,944	2.06	406	197	190	204
1894.....	131,603	2.08	395	190	165	171
1895.....	142,917	2.07	406	196	206	194
1896.....	148,991	2.10	365	174	206	192
1897.....	149,884	2.34	351	150	205	196
1898.....	145,504	2.41	367	152	229	211
1899.....	138,608	2.50	433	173	245	234
1900.....	144,206	2.40	398	166	242	234
1901.....	145,309	2.37	464	196	230	225
1902.....	148,141	2.41	279	116 ¹	248	230
1903.....	150,483	2.41	496	206	235	225
1904.....	155,861	2.31	469	200	196	202
1905.....	163,406	2.19	470	215	231	211
1906.....	162,355	2.25	439	195 ¹	231	213
1907.....	167,234	2.33	512	220	255	234
1908.....	174,174	2.39	478	200	201 ¹	¹ 193
1909 ³.....	.....	....	...	...	...	...
1910.....	169,497	2.17	498	229	238	217
1911.....	173,940	2.11	520	246	233	211
1912.....	174,030	2.10	485	231 ¹	252	233
1913.....	175,745	2.03	521	257	267	232
1914.....	179,679	2.06	505	245	214 ¹	² 195
1915.....	176,552	2.19	504	230	226	203
1916.....	159,869	2.16	548	253	259	230
1917.....	154,174	2.27	646	285	261	243
1918.....	147,121	2.28	672	293	269	249
1919.....	.....	....	...	252-262 ²	...	² 208
Average for entire period.....	.....	.....	.....	212	229	216

¹ Years when there were important stoppages of work pending adjustment of wages, etc.

² Estimated.

³ No data for 1909.



A cursory glance at this table might lead to the conclusion that irregularity has been largely eliminated. Beginning with the year 1900, a steady improvement is evident, which apparently culminates in the year 1918 with 293 days of employment. From this it might be concluded that with the growth of population the industry has achieved what is practically a full working year. Such a judgment would fail to take account of the actual interplay of forces determining the number of days work. A more thorough study covering the 30-year period ending with the present year will show clearly that the climax of this tendency toward regularity was reached in the years 1910 to 1916, when the mines were operated only 80 per cent of the year, and that the years 1917 and 1918 were abnormal. Today a readjustment to the normal of the years 1910 to 1916 is in process.

In general, a study of this 30-year period makes it possible to see the extent to which a thoroughly anti-social business policy has plunged the anthracite industry into a vicious circle, which will mean the perpetuation of a certain degree of irregularity in employment.

In this table, and throughout the exhibit, the comparison emphasized is that between the number of days worked in anthracite and the number worked in the Pennsylvania bituminous mines. This is done because of the similarity in determining factors between these two fields. Figures are also shown for the bituminous industry for the country as a whole. But it should be pointed out that, whatever comparison with the less comparable regions of the country may show, this will not in any sense vitiate the conclusions drawn from the comparison which is stressed.

Pennsylvania bituminous mines are more comparable with the anthracite industry than are the other bituminous regions of the country not only from the human standpoint, but also from the point of view of market conditions, which tend to determine relative regularity of conditions. In both branches of the Pennsylvania mining industry the element of uncertainty characteristic of a competitive market has been largely eliminated.

From the table above it appears that there are four periods which seem subject to slightly different influences so far as regularity of employment in anthracite is concerned. During the years 1881 to 1891, inclusive, the days worked averaged over 200. Then followed a decade in which the average fell off approximately 30 days, the low point being reached in 1897. During the years immediately following the great strike of 1902 the number of days worked approximated

the average for the 80s, while the decade ending with the present shows a steady improvement. Except for the two abnormal years 1917 and 1918, the average for this decade would appear to be about 243 days of operation to the year, which may probably be taken as a fair index of the present problem in the anthracite industry. This means some 61 days of idleness, or 20 per cent of the working year, in which the anthracite worker, through no fault of his own, is unable to earn a living.

But the chief interest is in the future. Analysis of the past is only to give some basis for estimating the future. In order to gauge whether this average is likely to persist, or whether the decline which followed the abnormal years of war demand is likely to go on until the industry has returned to earlier conditions of greater irregularity, it will be necessary to consider previous periods more closely.

II.

DETAILS OF DAYS WORKED FOR PERIOD 1881 TO 1891.

The following table is drawn to show the factors influencing days worked for the period 1881 to 1891. (Sources as mentioned above.)

DETAILS OF DAYS WORKED FOR PERIOD 1881 TO 1891.

Year.	Anthracite.			Days worked.	Bituminous.
	No. men employed.	Av. tonnage per man day. year.			
1881.....	76,031	1.90	420	221	(No data prior to 1890)
1882.....	82,200	1.96	427	218	
1883.....	91,421	1.81	421	232	
1884.....	101,073	1.92	368	192	
1885.....	100,324	1.87	382	204	
1886.....	103,044	1.93	379	196	
1887.....	106,517	1.90	395	208	
1888.....	122,218	1.75	381	218	
1889.....	123,676	1.90	368	194	
1890.....	126,000	1.85	369	200	
1891.....	126,350	1.98	401	203	
Average.....	208	

The outstanding feature of this table is the rapid increase in the number of men employed in the anthracite industry. In the course of 10 years approximately 66 per cent were added to the number employed in 1881. Between 1882 and 1883 the number increased by nearly 10,000. A similar increase was registered in the following year, while between 1887 and 1888 over 15,000 men were added to the army of anthracite workers. Meanwhile, with slight variations, the production per man per day remains almost constant. On the other hand, the anthracite production of the country increased, but not as rapidly as the working force. The consequence was a steady decrease in the number of days worked.

These facts indicate that the anthracite industry was passing through the speculative period. The rapid growth of population and the cheapening of transportation caused a rapid development of the trade. The development of the West accentuated this increase in demand. Anthracite was looked upon as a good thing in the way of investment. The consequence was rapid expansion, the construc-

tion of new collieries and the building of storage yards. This caused the increase in the number of anthracite workers. But, as is generally the case, this period of competitive speculation caused production to increase beyond what the market could absorb. Consequently the steady increase in the number of days of non-operation, which was to reach a climax in the 90s, had begun. Attempts to control production in order to keep the price up proved futile. The industry was not yet ready for large combination. E. W. Parker, in "Mineral Resources of the United States," 1889-90, comments upon the situation as follows:

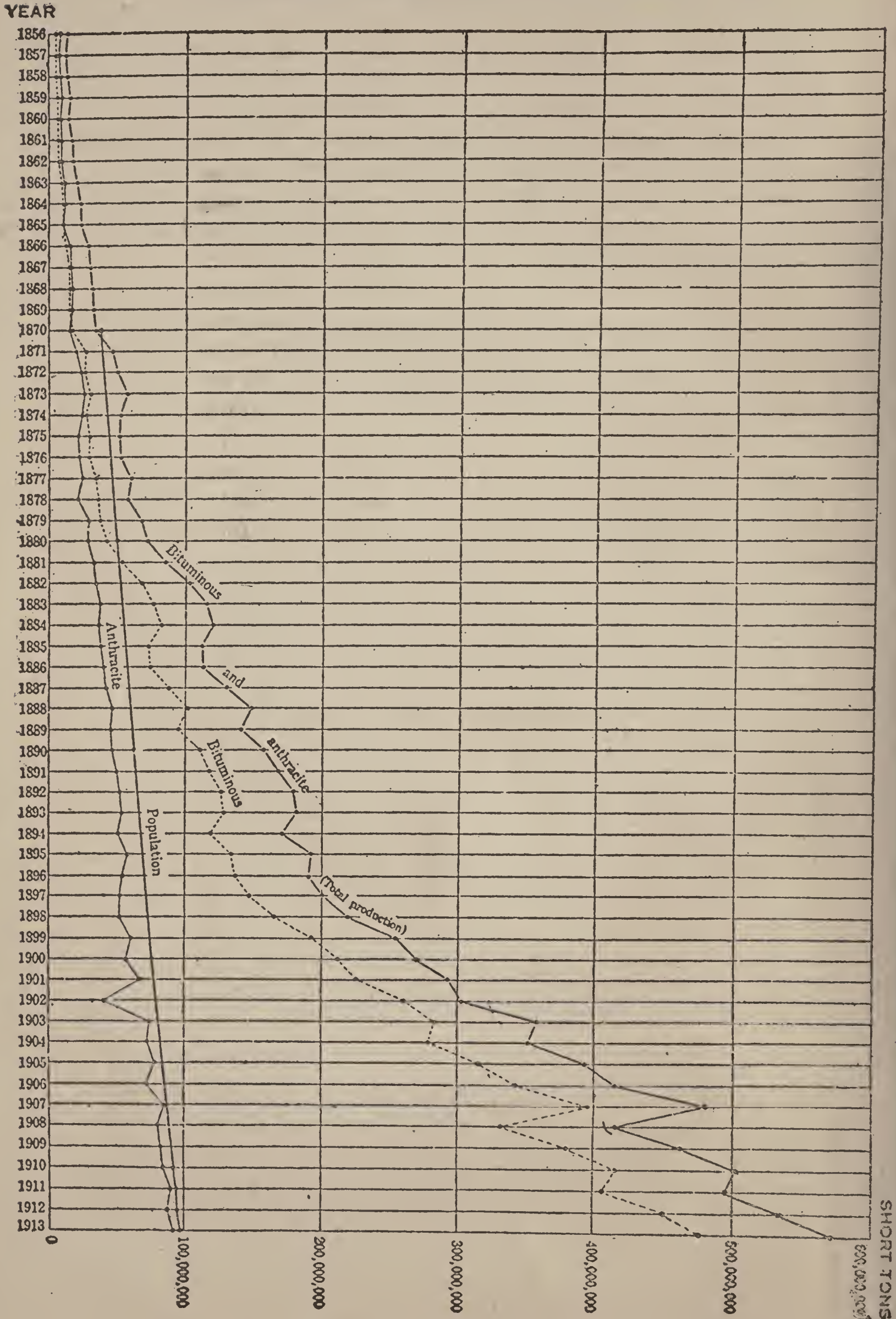
"The average number of days worked during the year 1889 by the collieries was 194. The suspension of mining during periods aggregating about one-third of the year was caused mainly by the inability of the market to absorb a larger product." (P. 243.)

Thus, early in the history of the trade, "no market" was the chief cause of irregularity of employment. But it must be remembered that this was not due to irregularity in the market, but to overinvestment in the industry. This fact of overinvestment has been a continuing influence since that time, and has been one of the principal causes of the low *yearly* earnings of the anthracite workers.

During this period 1881-1891, anthracite had not been completely ruled out as industrial fuel. Consequently, investors counted upon the expansion of the market paralleling the expansion of industry. As a matter of fact, this has been the case with the bituminous market. Anthracite, on the other hand, soon became almost entirely a domestic fuel, its place in industry being taken by bituminous coal and coke. As a result, the expansion of the anthracite market has tended more and more to parallel the development of population.

DIAGRAM SHOWING THE TENDENCY OF ANTHRACITE COAL PRODUCTION TO PARALLEL GROWTH OF POPULATION DURING YEARS 1856-1913, CONTRASTED WITH INCREASE IN PRODUCTION OF BITUMINOUS COAL AS INDUSTRIAL FUEL.

(From Mineral Resources of the U. S., 1913, Part II, p. 722.)



III.

PERIOD OF OVERPRODUCTION, 1892 to 1901.

The full effects of the tendency mentioned in the preceding section were not apparent until the last decade of the nineteenth century. Then the results of unchecked competition for expected profits appeared in unemployment and high costs, which rendered the situation even worse. The industry was operating in a vicious circle. Too much capital invested meant that the production had to carry so heavy an overhead that it could not compete for a market which bituminous was grabbing. Too many workers meant that the days of operation would have to be drastically curtailed. To meet this decrease in the opportunity to earn a living, the workers drove themselves to the limit to produce more per day, which only operated further to decrease the number of days worked. It was a situation which made the strike of 1902 inevitable. The development of the anthracite industry had been very badly managed. Not alone physical, but human resources were wasted. The following table tells the story, the sources being as mentioned above:

Year.	Anthracite.			Bituminous.		
	No. men employed.	—Av. tonnage per man— day. year.		Days worked.	—Days worked— Penna. U. S.	
1892.....	129,050	2.06	407	198	223	219
1893.....	132,944	2.06	406	197	190	204
1894.....	131,603	2.08	395	190	165	171
1895.....	142,917	2.07	406	196	206	194
1896.....	148,991	2.10	365	174	206	192
1897.....	149,884	2.34	351	150	205	196
1898.....	145,504	2.41	367	152	229	211
1899.....	138,608	2.50	433	173	245	234
1900.....	144,206	2.40	398	166	242	234
1901.....	145,309	2.37	464	196	230	225
Average,....	.....	.....	.....	179	214	208

The outstanding fact in the above table is that the anthracite mine workers, through no fault of their own, were forced to be idle an average of 125 working days per year during the whole decade. Second only in importance to this is the fact that, despite overproduction, the number of workers in the industry continued to in-

crease. Investment in the industry had been so unregulated that the working year amounted to a period of cut-throat competition for the "peak load." To meet this and secure a share of the market which would carry the large investment, the companies kept an oversupply of labor, apportioning the work out among the workers.

Overproduction meant competition and falling prices. To a large extent, the burden fell upon the worker. The market was demoralized. The situation is particularly evident in the figures for the years 1895-1898. An increase of over 10,000 in the number of workers in the industry, combined with the working of a few more days in the year, brought about such a state of oversupply that the market did not recover for a number of years. The number of days worked drops first to 174, then to 150 and 152. Not until 1898 had the number of workers begun to decline. And by that time the operators were taking steps to effect a combination with a view to restraining production. Speaking of this period, in "Mineral Resources of the United States," 1897, E. W. Parker says:

"In order to accomplish this result the mines were operated only three or four days in the week, but even with this restriction the supply of coal was lessened only about six per cent. It appears singular that with the working time cut down one-fourth or one-third the product is decreased only one-twelfth. The explanation is simple. During the busy season, when the mines are running full time, the miners rarely average as much as five days in the week, usually 'laying off' one or two weekdays as well as Sunday. When the mines are running but half or two-thirds time every miner puts in all the time he can, and probably averages more tonnage per day than when he has all the work he wants." (Page 13.)

Later, in the same report, we find the following comment upon the oversupply of labor:

"It may be opportune to mention at this time the difficulty presented by the labor question in the anthracite regions, viz., the overplus of miners and laborers. Thus, in tables in the beginning of this report it will be noted that although the product fell off over 3,000,000 tons in 1896 as compared with 1895, the total number of employees increased 6,000. It will be seen at once that these men must have worked shorter time. This was the fact, and although wages, measured by day's work, were higher in 1896, it is questionable whether the miners individually benefited to any great extent. It is evident, of course, that there are too many men for the amount of work to be done, but a remedy for the difficulty does not easily present itself.

While there is any likelihood of work the miners will not leave the vicinity of the mines, and the companies try so to apportion the work as to give all a chance, with the result that there is not enough work for any.

“With a very much larger output this trouble would no doubt adjust itself; but that condition is not in sight in the near future. In the meantime it is a question whether it would not be better for the companies to give their old employees measurably steady employment and drop from the rolls all such as could not be thus provided for, allowing them to seek work elsewhere. (Pages 249-50.)

This solution would not have fitted in with the policy of companies which were, as pointed out, fighting for as large a share of the “peak load” as they could handle. For this it was necessary to have on hand an abundance of cheap labor. In terms of such a market situation, it was to the interest of the competing companies to encourage workers to stay on part-time work. From the above it appears that this policy was definitely pursued.

Other factors were entering into the situation. It was during this period that anthracite became entirely a domestic coal, its market responsive chiefly to changes in the weather, and to growth of population. And it is at this point that one comes face to face with the effect of over-investment. To quote E. W. Parker in “Mineral Resources of the United States” for 1897.

“Mr. Wm. B. Ruley, in his contribution on the production of Pennsylvania anthracite, cites two reasons which have been assigned for the decrease in anthracite consumption. The first of these is the increased use of bituminous coal in competition with the smaller sizes of anthracite for steam raising; the second is the increased consumption of gas for cooking and other domestic purposes. To this must be added another factor—the decreased production of anthracite pig iron. The output of anthracite pig iron in 1897 was more than 200,000 long tons less than in 1896, while the production of pig iron made from bituminous coal and coke increased nearly 1,300,000 long tons. * * *

“The three causes mentioned have undoubtedly had an adverse effect upon the anthracite interests. Nor is it practicable in the face of existing conditions to so reduce the selling price of anthracite coal that it may successfully meet the competition of bituminous coal, coke and gas. The success of these competitors of anthracite coal may be directly attributed to the unwisdom shown in over-developing the anthracite fields. Enormous outlays of capital in acquiring property and constructing improvements in the boom days of anthracite development are reflected now in ‘fixed charges’ and other ex-

penses which make it impossible to materially decrease the cost of production. The facts brought out by the unfortunate affair at Hazleton during the summer of 1897 furnish reliable evidence that the miners are not overpaid. The rate per ton paid for mining is low enough now, and as the mines are frequently closed down one-third or one-half the time the employees are necessarily unable to earn more than two-thirds of the wages possible if they were allowed to work full time. As will be seen further on, the miners endeavor to make up for this, in part, by mining more coal per day than they are accustomed to when the mines are running regularly. But such efforts do not offset the losses they suffer through compulsory idleness."

This last paragraph merely shows the vicious circle into which the eagerness for profits had plunged the anthracite industry. In the next paragraph Mr. Parker completes the picture:

"It would seem that with a restricted production and prices well controlled the anthracite interests would be in excellent condition, so far as the operators are concerned; but restricted production and higher prices have reflex actions upon industry which are not always considered. In the first place, when tonnage is reduced the mining cost of every ton of the product won, owing to the regularity and uniformity of the 'fixed charges,' etc., is proportionately increased, while every additional advance in the price produces a diminution in the market demand, and offers an opportunity for the increased consumption of soft coal, coke or gas, as the case may be. Under the prevailing conditions there is reason to believe that the maximum of anthracite production has been, or soon will be, reached. It is certainly safe to predict that the demand will never exceed the present capacity of the anthracite mines."

In other words, the problem of regularity, or irregularity, of employment in the anthracite industry is primarily a question of a balance between the development of the field and the market. And already outside conditions were coming into being which foreshadowed the day when the anthracite industry would have reached a state of equilibrium. If the market had ceased to advance with the workers in the hopeless state prevalent in the last years of the nineteenth century, the anthracite region would indeed have been a blot upon the industrial page of the nation. The situation, created by bad management, was the primary basis for the series of strikes which followed in 1900, 1902 and 1906.

The fact has been pointed out that anthracite was becoming primarily a domestic coal. Already there was beginning to be compe-

tition in this field as well not only from gas as a cooking fuel, but also from the fact that the great office buildings and apartment-houses had begun to grow. In these bituminous steam coal was used for heating in place of anthracite.

A glance at the reports of the Pennsylvania Bureau of Mines shows the same feeling that the development of the anthracite mines had outdistanced the market. The report for 1898 reads as follows:

“The market for anthracite coal has apparently reached its limit. It is true there is an increase in 1898 of 197,821 tons over 1897; but that is in all probability due to the extraordinarily severe weather that prevailed. It appears from the number of days that the mines were in operation during the year that the mines now opened and number of men employed, are capable of producing very much more coal, which shows that there are more mines opened and more men employed than are necessary to supply the demand.” * * *

The feeling among experts at this time seems to have been that, with the limited district in which anthracite is found, the production per day would remain at slightly over 300,000 tons, and that the question of the number of days worked would be determined largely by the number of these 300,000-ton units required by the market. All along there is no doubt but that *market* is the determinant.

IV.

PERIOD OF ORGANIZATION OF THE MARKET FOR
DOMESTIC COAL, 1903 TO 1908.

With the beginning of the twentieth century the period of irresponsible competition was over. Both labor and capital in the industry were organizing, which meant regulation in the future. The first important step was taken by the companies when they announced the summer discount policy. This tended to regularize the market—that is, to spread its demands evenly over the full year.

Speaking of this summer discount policy, the Pennsylvania Department of Mines Report for 1904 said:

“The demand for domestic sizes continued remarkably even throughout the year owing to the operation of the discount plan. By this plan a discount of 50 cents a ton from the schedule price is offered on purchases made in April, with a gradual decrease of 10 cents a month in the discount during May, June, July and August. This method insures a more even distribution of coal throughout the year. The retail dealers and householders have a special inducement to make early purchases, which are stored for winter use, thus maintaining the tonnage during a period generally characterized by inactivity and reducing proportionately the danger of congestion in shipping later in the season.” * * *

Speaking of the contrast between the periods before and after this step was taken, E. W. Parker, in the 1913 “Mineral Resources of the United States,” says:

“It will be observed that in the anthracite mines during the last decade of the 19th century there was a notably decreasing tendency in the number of days the workers in the anthracite mines were able to work, until in 1897 and 1898 they barely averaged 50 per cent of the possible working days in the year, excluding Sundays and legal holidays. These figures substantiate the claim made about that time that the anthracite miners were unable to earn a total living wage. The consumption of the prepared sizes of anthracite being almost exclusively for domestic purposes, the production was at a ‘peak load’ during the fall and winter months, with long periods of idleness during the summer. In order to meet the demands of the ‘peak loads’ it was necessary to keep on the rolls a much larger number of men than if steady employment could be given the year round. * * * Beginning with 1903, however, a marked improvement is shown in the working time made by the anthracite

miners. From 1892 to 1902, inclusive, the anthracite mine workers did not average as much as 200 days in any one year, and the general average for the period was 173 days. Since 1903, on the other hand, the anthracite miners have averaged less than 200 days in only one year, 1906, when there was an extended suspension pending the renewal of the anthracite strike commission's awards, and the general average of the period has been 220 days, 47 days or 27 per cent more than the general average for the earlier period." * * *

The following table gives the data for this period of readjustment:

Year.	Anthracite.			Bituminous.		
	No. men employed.	—Av. tonnage per man— day. year.		Days worked.	—Days worked— Penna. U. S.	
1903.....	150,483	2.41	496	206	235	225
1904.....	155,861	2.35	469	200	196	202
1905.....	163,406	2.19	470	215	231	211
1906.....	162,355	2.25	439	195	231	213
1907.....	167,234	2.33	512	220	255	234
1908.....	174,174	2.39	478	200	201	193
Average.....	.....	.....	.....	206	225	213

During this period, although the average for such years as 1902, 1906 and 1909 is considerably influenced by the serious stoppages of work which occurred pending the adjustment of disputes between the mine workers and the operators, the general average for the period, 206 days, is primarily an index of market conditions. This is the result of the fact that adjustment every three years had become the regular thing, for which preparation was made in the preceding year. The succeeding year was also, to a large degree, influenced by compensatory production. Thus we notice in the table that the year of stoppage, 1906, is preceded and followed by years during which the number of days operated was relatively high. In this connection we find the following comment upon the year 1903 in the report of the Pennsylvania Department of Mines:

“The long and disastrous strike of 1902 had depleted the supply of coal to such an extent that it required full and continuous work at the mines for the first 10 months of 1903 to restore the normal conditions of the trade in this country and in Canada. During November and December, however, the pro-

duction was greatly curtailed, owing to a cessation, in the demand, and most of the operations closed down completely on the 24th of the latter month." * * *

So again, in the publication of the United States Geological Survey, "Mineral Resources of the United States," a hint is given to the same effect. Speaking of the high average days worked in 1905, Mr. Parker writes:

"This average for the anthracite mine workers was the highest recorded in the 16 years that the statistics have been obtained, and was probably due to the efforts put forth by the operating companies to lay in a large supply of coal in anticipation of a strike when the award of the anthracite coal commission expired in the spring of 1906."

As a matter of fact, the extraordinarily low averages of the '90s no longer prevailed. The relation between the market and the supply existing in the '80s had to all intents and purposes been re-established. Experts considered that the market was about equal to the supply, and, as the increase in number of workers in the industry tended to parallel the slow increase of the market, it would seem as though 206 odd days were considered as constituting a fair year's work in the anthracite fields.

During this period experts remark increasingly on the probability that the anthracite industry has reached its high-water mark. This opinion is based chiefly upon the increasing cost of production, which tends to handicap anthracite in competition with other fuels. In any final judgment as to the probable employment in the industry in the future this factor must be considered. It is remarked that a portion of this increased cost is due to the fact that the workers themselves are producing a smaller quantity per day. But the men giving this opinion are not always careful enough to state that this decrease in the productivity may largely be accounted for by the increasing difficulty of mining as the seams are worked farther and farther, often becoming thinner as the mines go deeper.

DAYS WORKED IN PENNSYLVANIA ANTHRACITE MINES COMPARED WITH OTHER MINING COUNTRIES.

In the 1906 report of the Pennsylvania Department of Mines there is a small table showing for the period now being considered the comparative time worked in certain coal-producing countries as com-

pared with Pennsylvania anthracite. The table is here reproduced, in order to show to what extent the American anthracite miner is suffering from irregularity of employment more than his fellows in other countries. With the average days worked in the other countries standing at 282, it must be obvious that the mines in those countries have not been subject to the unregulated exploitation from which the miners in the United States have been the chief sufferers.

DAYS WORKED IN VARIOUS COUNTRIES.

Pennsylvania anthracite (1903).....	211
Great Britain bituminous (1903).....	264
Germany, bituminous (1903).....	274
France, bituminous (1900).....	296
Belgium, bituminous (1902).....	289
Austria, bituminous (1903).....	289
Average for foreign countries.....	282

THE ANTHRACITE INDUSTRY DURING THE PAST DECADE.

From the preceding pages it is evident that the problem of regularity in the anthracite industry is primarily a problem of the ability of the market to absorb the full production of the labor employed. It appears that this market is chiefly responsive to weather conditions and to the growth of population. From the time when the summer discount was introduced the steady growth of population has tended to improve the very bad conditions which resulted from the speculative overinvestment in the industry. But other factors were coming into play which tended more and more to render it doubtful whether the industry would ever reach full-time operation. With these facts in mind, it would appear, from an examination of data for the decade ending with the present time, that the average for the years 1910 to 1916, inclusive, will be found to represent approximately the best average days worked that can be expected from the industry. In other words, it represents a real balance between the demands of the market and the possible production of the limited mining area, which will not be exceeded, and which may tend toward a slow decline, for reasons which will be noted. The average for these years is 242 days of operation, which corresponds almost exactly with the days worked in the Pennsylvania bituminous mines for the same years. The correspondence is even closer than the rough average shows, the exact figures being for the anthracite mines, 241.57, and for the bituminous mines, 241.29. In other words, taking the full number of days worked for the seven years, it will be found that the totals differ by only two days, being 1691 and 1689, respectively. This would certainly seem to indicate relative stabilization of the situation in Pennsylvania at approximately 242 working days, which means a loss to the workers of some 63 possible working days each year, or something over 20 per cent of the year. The exact figures appear in the following table:

Year.	Anthracite.			Bituminous.		
	No. men employed.	—Av. tonnage per man— day. year.		Days worked.	—Days worked— Penna. U. S.	
1910.....	169,497	2.17	498	229	238	217
1911.....	173,940	2.11	520	246	233	211
1912.....	174,030	2.10	485	231	252	233
1913.....	175,745	2.03	521	257	267	232
1914.....	179,679	2.06	505	245	214	195
1915.....	176,552	2.19	504	230	226	203
1916.....	159,869	2.16	548	253	259	230
Average.....	.....	.....	.....	242	241	219

With the beginning of this period the production of anthracite had reached a level at which it appeared likely to remain. In other words, despite the growth of population, it appeared that other conditions, such as the movement to steam-heated apartment-houses, etc., were likely to prove a counter influence. In "Mineral Resources of the United States" for 1913, it is remarked:

"The increase in the use of artificial gas and coke for domestic purposes will probably keep pace with the increase of population in the markets supplied by anthracite, and there is little probability that the production of anthracite will show any marked increase in the future. Changes in temperature and labor conditions will continue to be the most important factors affecting the production of anthracite."

Anthracite had almost ceased to respond to ordinary business changes, in which characteristic it differed radically from bituminous coal. And the belief that the maximum regular production of anthracite had been reached seems to be borne out by the fact that the estimated production for 1919 is very slightly in excess of that for 1910, and distinctly less than that for 1911. In short, the production of anthracite may be expected to average under 90,000,000 tons per year. In the year of abnormal demand, 1917, which will be mentioned later, although the production reached nearly 100,000,000 tons, less than 94,000,000 tons of this was actually consumed. Thus, in an attempt to estimate the regularity of employment, the number of days required to produce 86,000,000-odd tons with the labor in the industry should probably be taken as maximum.

Before turning to consider the abnormal years 1917-1918, a few

facts which appear in the above table should be noted. In the first place, it is again to be noticed that the fewer days worked in the year of adjustment, 1912, are compensated by the higher averages for the years preceding and following. In the second place, it appears that the increase in number of days worked during this period as contrasted with the previous period may be in part due to the fact that the mine worker is producing considerably less per day. In fact, the two changes seem to be very closely parallel to each other. And, finally, it may be noticed that the number of workers in the industry, having reached a maximum in 1914, has begun a very decided decline, there being approximately 20,000 less workers in 1916 than in 1914. As a matter of fact, this decline continued until in 1918 there were only approximately 147,000 working in the anthracite mines, a figure below any since 1902.

This last tendency is important from two points of view. In the first place, the increased number of days worked during the last four years corresponds to a shortage of labor from the point of view of the companies. This means that if that shortage of labor is made up, fewer days will again prevail. In the second place, it means that irregular, low-paid work in the anthracite industry proved unattractive when contrasted with the opportunities in the expanding munitions industry of the years mentioned. The decrease in the number of anthracite workers represents a drift to the manufacturing industries.

THE EIGHT-HOUR DAY AND THE REGULARITY OF EMPLOYMENT.

In order to forestall the possible contention that the eight-hour day, in effect since 1916, can be held responsible for the increased number of working days in 1917 and 1918, the tables presented in this exhibit include figures as to the tonnage produced per man per day. The contention has already been advanced to the effect that the number of days of work in the years 1910 to 1916 would have been considerably increased had an equivalent eight-hour day been substituted for the nine-hour day actually worked. The actual figures disprove any such assertion. Every competent industrial engineer is cognizant of the fact that a reduction in hours per day may actually tend to increase rather than to decrease the productivity of the worker. The important question in an industry where the number of days worked is determined by the demands of the market

is in reality the number of tons that would be required from each man employed. As the miners are paid on a tonnage basis, this will be the figure which will determine whether they are adequately or inadequately paid.

If the attempt is made to ascertain the number of equivalent eight-hour days which were worked during the years 1910 and 1916, when a nine-hour day was effective, not by multiplying by nine-eighths, but on the basis of tons produced, the unexpected conclusion is reached that on an eight-hour-day basis fewer rather than more days would have been worked. A glance at the tables will show that the mine workers produced more coal per man per day in the eight-hour years 1916 to 1918 than they did in the nine-hour years 1910 to 1915. This information can be segregated in a table, as follows:

PRODUCTION PER MAN PER DAY AND DAYS WORKED, COVERING
9-HOUR AND 8-HOUR YEARS.

Year.	Tons per man per day.	Days worked per year.	Equivalent 8-hr. days on basis of of average production.
1910 (9 hours).....	2.17	229	226
1911 (9 hours).....	2.11	246	
1912 (9 hours).....	2.10	231	
1913 (9 hours).....	2.03	257	
1914 (9 hours).....	2.06	245	
1915 (9 hours).....	2.19	230	
Average	2.11	240	
1916 (8 hours after April).....	2.16	253	
1917 (8 hours).....	2.27	285	
1918 (8 hours).....	2.28	293	
Average.....	2.24		

Obviously, if during the nine-hour years the worker had produced as much coal per man per day as during the succeeding eight-hour years, they would have worked only 226 days per year instead of 240 to meet the demands of the market. In other words, the industry would have been more irregular than it actually was.

That production may increase when hours are decreased is substantiated by the experience of the short-hour mines of Durham and Northumberland, in England. Mr. Cunningham, Assistant Under Secretary for the Home Department, in his evidence before the

Miners' Eight-Hour-Day Committee in 1907, said, in commenting upon a reduction of 12½ hours per week in the mines above referred to:

“We have every right to presume that the production did go up while the hours went down.”

This committee of the British Government, the recommendations of which led to the Eight-Hour Law, summarizes its conclusions from evidence as follows:

“Nevertheless, after making allowance for this governing fact, and comparing like with like, so far as the evidence enables us to do so, we cannot but conclude that an hour's work of the men employed in East and West Scotland, Northumberland and Durham, where the hours of work are shortest, is more effective than it is in Lancashire and South Wales, where the hours are longest. The tables do not show a uniform proportionate correspondence, but they do show some general relation between short hours and efficient work.”

Such facts as these, which are today well known to industrial experts, show the impossibility of reducing the actual day's work to any equivalent basis merely on the basis of number of hours worked. For this reason the 242 days average for the period under consideration stands as a conservative estimate of the irregularity prevalent in the industry under normal market conditions. Had the market for the year 1917 to 1918 been normal and the usual supply of labor been available, such production per man per day as prevailed in those years would have resulted in greater irregularity than that shown as the average for the preceding years.

THE YEARS 1917 TO 1918 NOT AN INDEX OF REGULARITY.

As already pointed out, the years 1910 to 1919 cannot be averaged together as a homogeneous period to show that the growth of population is actually bringing about regularity in the industry. The following table shows conclusively that the years 1917 to 1918 stand apart as abnormal years. The production figures used in this table were prepared by the mine operators.

CONTRAST BETWEEN NORMAL AND ABNORMAL YEARS IN ANTHRACITE
INDUSTRY.

Year.	Production			No. of men employed.
	Prepared and pea (tons).	Steam sizes (tons).	Days worked.	
1912.....	45,678,201	17,932,377	231	174,030
1913.....	50,594,305	18,475,323	257	175,745
1914.....	49,998,507	18,344,094	245	179,679
1915.....	48,944,747	18,939,029	230	176,552
1916.....	48,245,724	19,130,640	253	159,869
Average ..	..... 48,692,297	.....	.....	.....
1917.....	53,487,277	23,646,028	285	154,174
1918.....	51,974,714	24,675,204	293	147,121
Average ..	..... 52,730,992	.....	.....	.....
1919.....	48,991,572	17,863,739	(252-273)	152,000

This shows the very interesting fact that the production figures for 1915, 1916 and 1919 are approximately equal. They are approximately equal to the average production for the years 1912-1916. This would seem to indicate that during the last decade the anthracite market has reached a relatively stable position with an average production in domestic sizes of approximately 48,000,000 tons. In contrast with this average, the years 1917, 1918, with the production of domestic sizes 8 per cent higher, and an even greater increase in the production of steam sizes, appear distinctly abnormal.

This abnormal condition of the market has been recognized by practically all authorities engaged in observing the course of the industry. In this connection the following quotations and various Government reports are interesting:

“There has undoubtably been an immense artificial demand for anthracite this spring. Thousands of householders who normally do not buy until fall have this year poured in their orders in April and May.” (P. 31.)

“The greater consumption of large sizes of anthracite by gas and carbon plants and by railroads has caused an increase in demand for these sizes. This is due largely to the fact that coal which formerly came into competition with anthracite coal has been diverted to other uses. Many gas plants which in the past have been making coke as a by-product, some in competition with anthracite, have very materially curtailed their output because of the high price of soft coal. Large manufacturing plants which use coke in connection with their manufactur-

ing processes have turned to anthracite on account of the shortage in coke. * * * Public utilities in some parts of the country have been affected to a considerable extent by the shortage of coke and have substituted anthracite for it. And unprecedented industrial activity created a growing demand for steam sizes by manufacturing plants regularly using anthracite. * * *

“The great expansion of industrial activity in the steel, the cotton textile, and the munition industries accounts for a material increase in the consumption and demand for bituminous coal, which in turn has indirectly placed an added demand on the anthracite supply by industries that could substitute anthracite when bituminous could not be had or when the price of bituminous was higher than that of anthracite.” * * *

(Pp. 84-85, report of Fed. Trade Com. on Anthracite and Bit. Coal, June, 1917.)

“The requirements of the country for anthracite for domestic use, for the military uses of the government, for water gas manufacture, and for industrial purposes to replace coke withdrawn for the iron industry, were greater in 1917 than in in any previous year. * * *

“The shortage of bituminous coal in the Eastern States was pronounced throughout the year, and the fine sizes of anthracite were eagerly sought as a substitute for mixture with bituminous coal by industrial plants, especially during the last third of the year.” * * * (P. 1014 Mineral Resources of U. S., 1917.)

In connection with the shortage of labor, after remarking on the drift of low paid mine labor to the munitions industries and upon the fact that this did not result in a corresponding decrease in production, the Federal Trade Report makes the following interesting comment:

“From these facts it is clear that great credit is due to the miners and to the mining companies. Apparently the remaining labor force, though working only 8 hours a day instead of 9, was more efficient and the companies managed their operations so as to produce the maximum possible under the difficulties encountered.” (P. 35.)

These quotations may be supplemented from the weekly bulletins of the Geological Survey for the year 1919 as follows:

“The total output since the beginning of the coal year is naturally far short of that of last year, when an abnormal demand for anthracite was created by the shortage of bituminous.” (Sept. 27, 1919.)

“To compare 1919 with the exceptional years of the war is perhaps deceptive. A more instructive comparison can be had between the first six months of the coal years beginning April 1, 1919, and 1916, etc.” * * * (October 11, 1919.)

LABOR SHORTAGE AND REGULARITY OF EMPLOYMENT IN 1917 AND 1918.

Perhaps even more significant a cause of the abnormal regularity of employment in the industry during 1917-1918 was the shortage of labor caused by the war. The close correspondence between number of mine workers and number of days worked per year appears clearly in the above table. The average number of men employed in the anthracite industry for the abnormal years 1917-1918 was 150,647. As contrasted with the average for the previous six years, 173,502, this shows a falling off of over 22,000. In other words, during these years of abnormal regularity there were 15 per cent. fewer workers producing 8 per cent. more coal to meet the demand for domestic sizes. This takes no account of the extra men required to produce the additional steam sizes. Clearly it required labor shortage coupled with a highly artificial demand to bring about regularity even approximating a full working year in the anthracite industry.

As a concrete illustration of the way in which the decrease in number of men employed actually increases the regularity of employment we might take the year 1918. In contrast with this year the average of men employed in the years prior to the war was 20 per cent. higher. As already pointed out the question of adequate employment may be considered either in terms of the number of tons which the market requires per worker or in terms of the number of days which the mine operates to meet the demand. Assuming that the average requirements of the market amount to 90,000,000 tons annually of all kinds of anthracite this would mean that each worker would have hypothetical opportunity to produce 600 tons per year when the smaller number of men were employed as contrasted with 523 tons per year with the normal labor force on hand. In terms of number of days worked the conclusion is even more interesting. In order to meet the market requirements in 1918 with approximately 147,000 workers, 293 working days were required; if the number of workers had been 20 per cent. higher as was the case prior to the war it would have required only 252 days to satisfy the market. This represents approximately the best estimate as to the probable number of working days in the industry under normal conditions.

Following the conclusion of the war, conditions in the industry have been steadily returning to normal. As shown in the analysis of the production figures prepared by the operators, the production of coal for 1919 was approximately the average for the years 1910 to 1916, during which the mine workers were unemployed for twenty per cent of the year. The other determining factor, labor shortage, is also being reduced to normal. According to the weekly report of the Geological Survey for August 9, 1919, "it is reported that the supply of labor in the anthracite regions is improving." This is confirmed by the figures submitted by the operators which show that nearly 5,000 men have been added since the lowest point was reached in 1918. The fact of over-investment in the industry is therefore operating again to bring more labor into anthracite mining than the annual market would require if regular conditions of employment were maintained.

In other words, an analysis of the forces which determine conditions of employment in the anthracite industry will lead to the conviction that the forces in operation since the war have been steadily reducing the industry to approximately the condition which prevailed during the years which averaged 242 days of operation. The market required no more prepared and pea coal in 1919 than it averaged for the years 1912-1916. The weekly bulletins issued by the Geological Survey show a steady decline in the requirements of the market following the armistice.

THE YEAR 1919 NOT COMPLETELY NORMAL.

Even the year 1919 cannot be considered as a completely normal year. The market would have required less coal from the anthracite mines in 1919 had it not been for the artificial situation created by the bituminous strike. This is clearly shown in the reports of anthracite production compiled week by week at the U. S. Geological Survey. To quote the comments of this weekly report:

"Anxiety felt by consumers over the impending bituminous strike was reflected in the demand for anthracite, production of which reached a new high level for the year." (Nov. 1, 1919.)

"The anthracite industry responded to the stimulus of active demand caused by the soft coal strike with the largest production of the year." (Nov. 29, 1919.)

"The output of anthracite during the week ended December 6 continued at the high rate maintained since the commencement of the bituminous strike." (Dec. 13, 1919.)

“Responding to the active demand caused by the growing shortage of bituminous coal the output of anthracite during the week ended December 13, rose to the highest level attained this year—indeed, the highest in any week since September, 1918.” (Dec. 20, 1919.)

In other words, had it not been for this abnormal demand during the last weeks of 1919, the production of that year would have been lower than the figure shown by several hundred thousand tons.

The year 1919 also shows a continuation of the shortage of labor which existed during the war, although the industry had started to return to its pre-war quota. As this increase in the number of workers continues, it will mean some increase in the production per day with a consequent reduction of the number of days necessary to produce for the market.

LESS COMPLICATING FACTORS IN ANTHRACITE THAN IN BITUMINOUS MINING.

In general it might be remarked that there are less complicating factors in the anthracite branch of the coal industry than in bituminous. Whereas over 50 per cent of bituminous coal is produced by machinery, with the use of machinery increasing, it has not yet been found possible to use machines in anthracite except to a to a very limited extent, approximately 2 per cent of the coal being so produced. This means that the problem of regularity will not be immediately affected by a rapid increase in the productive capacity of the individual worker.

Again, it may be noted that the problem of “car shortage” is not so serious in the anthracite industry as in bituminous. This is explained by the Federal Trade Commission Report as follows:

“In the anthracite industry, where the initial anthracite railroads are identified or affiliated with the larger mining companies, the transportation difficulties are less serious than in the bituminous industry. With minor exceptions the car supply for the production of coal at the anthracite mines seems adequate.”

The Commission obtained statistics relating to the railroad car supply at the operations of fifteen anthracite mining companies. Their consolidated tabulation is given below.

ESTIMATED RAILROAD-CAR TONNAGE REQUIREMENTS OF 13 ANTHRACITE MINING COMPANIES, AND ESTIMATED COMMERCIAL TONNAGE LOST THROUGH AN INADEQUATE CAR SUPPLY BY MONTHS, 1915 AND 1916. (GROSS TONS).

Month.	Estimated commercial shipments if fully supplied with cars.		Tonnage shipped.		Estim. produc. of coml. tonnage lost thru an inadequate car supply.	
	1915	1916	1915	1916	1915	1916
January	3,250,582	4,417,709	3,141,210	4,097,664	109,372	320,045
February	2,959,208	4,369,660	2,836,550	3,976,877	122,658	392,783
March	3,486,654	4,894,091	3,338,020	4,394,644	148,634	499,447
April	4,604,499	3,279,103	4,605,631	3,073,936	¹ 379	205,167
May	4,136,732	3,950,546	4,051,140	3,776,639	85,592	173,907
June	3,734,623	4,077,789	3,699,578	3,989,027	335,045	88,762
July	3,469,623	3,917,704	3,389,589	3,820,079	80,034	97,625
August	3,661,909	4,084,790	3,626,009	3,965,309	35,900	119,481
September	3,799,054	4,083,075	3,811,188	3,866,956	² 2,396	216,119
October	4,659,901	4,292,709	4,562,631	4,138,915	97,270	153,794
November	4,557,863	4,402,371	4,467,130	4,299,327	90,733	103,044
December	4,553,814	4,179,373	4,176,305	4,076,594	377,509	102,779
Total 14 Co.'s..	46,874,462	49,948,920	45,704,981	47,475,967	1,185,522	2,472,953
1 Co. 12 mos...	4,642,807	5,137,916	4,562,925	4,413,507	79,882	724,409
Tl. 15 companies	51,517,269	55,086,836	50,267,906	51,889,474	1,265,404	3,197,362

The data in the preceding table represent returns from companies shipping 72.6 per cent of the commercial shipments of anthracite during 1915 and 76.2 per cent of the commercial shipments during 1916. The loss in potential production resulting from inadequate railroad car supply was for the above years, 1,265,404 gross tons and 3,197,362 gross tons, respectively. This meant a loss totaling only 2.517 per cent of their combined commercial shipments in 1915, and 6.161 per cent of these shipments in 1916. Thus it appears that although the figure rose somewhat in 1916, the problem of car shortage is not acute in the anthracite industry.

There is one other factor which has been referred to from time to time which must be mentioned again, i. e. idleness due to strikes. From the previous discussion the impression may have been gained that the degree of idleness due to such strikes was very considerable.

¹One company reported car tonnage furnished in excess of shipments, 1,511 tons in April, 1915, and 14,530 tons in September, 1915.

A diagram has been prepared recently by the U. S. Geological Survey in order to gain some idea of the extent to which strikes are a factor in non-operation in the coal industry. As shown in the diagram, idleness due to strikes has, during the period 1910-1918, amounted to but a little over one-tenth of the total days of non-operation. And here it should be pointed out again that, except for the strike of 1902, which has been left out in reckoning the general average, the strikes have not materially affected the average because they indirectly caused a compensatory greater number of days worked in the preceding and succeeding years.

VI.

PROBABLE IRREGULARITY IN THE FUTURE.

In estimating the probable number of days which will be worked in the anthracite industry under present circumstances, two broad facts must be considered, (1) the market requirements and (2) the number of men employed. There is of course a third variant, the production per man per day. The fact that this third item enters creates a very interesting situation. Given certain market requirements and a certain number of workers, the setting of a low rate by forcing the men to speed up production for the sake of gaining adequate earnings tends to cause them to produce the supply in fewer days. Thus low rates in the industry will place the workers in a dilemma in which they have a choice between earning more per day with fewer days in which to earn the annual wage, or extending the same annual earning over a greater number of days. This really points to the abnormal condition of the industry.

Briefly summarized, the forces operating to determine the present situation in the industry might be stated as follows:

(1) Competitive over-investment and inflated capitalization have provided the industry with a burden of overhead which it has been forced to carry since the market was organized on a more or less non-competitive basis.

(2) This situation rendered high prices necessary. These were maintained in part by artificial limitation of the supply through the organization of the market on a non-competitive basis.

(3) There resulted a growing encroachment of low-price bituminous coal, fuel oil and gas upon the various branches of the anthracite market. This first limited the growth of the anthracite market to the steady increase in population, and finally tended to cut in even upon the domestic market.

(4) During the last decade these forces have tended to produce a state of equilibrium at what is probably very nearly the maximum steady production which the anthracite industry will attain. In other words, general opinion confirms the belief that the anthracite market reached its normal level during the years just preceding the war and that it is not likely to exceed this level in the near future. With a normal labor force, therefore, it cannot be expected that the anthracite industry will exceed an average of 250 days operation. Variation below this figure will be determined primarily by market

conditions. The probable average of days of operation is more likely to approximate 242 days. In other words, the most optimistic view possible can promise the anthracite mine worker scarcely more than 80 per cent employment. He is faced with the probability of at least 60 working days in which he will be unable, through no fault of his own, to earn a living wage.

In connection with this estimate it should be pointed out that were the abnormal conditions of the war years to continue, the anthracite industry will probably prove unable to maintain steady operation at anything like the rates shown for those years. According to the report of the Pennsylvania Department of Mines for 1903

“The number of working days * * * can hardly exceed 250 in the year, as the repairs to the mines, inside and outside, require many weeks, and the loss of several weeks more is caused by various accidents, explosions, flooding and cave-ins of mines, and breaking of machinery.”

In fact, in forming any estimate it must be recognized that, as in the case of so many other industries, the exigencies of war produced a straining to accomplish the necessary work which tended to neglect the usual repairs and the upkeep of various material parts of the various mine property. Such a pace could not be maintained for a long period.

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