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CHAPTER 4

MINES, QUARRIES, AND OIL WELLS

§ 4a. Sources of Information

The four chief sources of information concerning this field are the Census, the reports of the United States Geological Survey, the United States Income Tax data, and the reports of various State Bureaus devoted to the study of mining or labor conditions. Unfortunately, the State reports, in most instances, are either issued irregularly or fail to furnish information comparable for the various years under consideration. This necessarily results in a distinct loss of accuracy in the estimates based thereupon.

§ 4b. The Share of the Entrepreneurs and Other Property Owners

The share of the entrepreneurs and other property owners in the net value product consists of the rents, royalties, and interest received by private parties from their investments in this field plus the profits derived from the mining industry by the private or corporate entrepreneurs operating therein. In estimating the aggregate of rents and royalties, it has been assumed that these payments vary in proportion to the gross value of mineral products in the United States as reported by the United States Geological Survey. The Census of 1909 is used as a base. Royalties at a fixed rate per ton would not increase with the price level and hence contracts of this type would tend to make the estimates for the later years too high. On the other hand, many royalties become proportionally greater as mineral output increases in value. Contracts of this variety would tend to offset the effects of those of the type first mentioned. Since the relative weights of these factors are unknown, the assumption that they cancel each other is the best that can be made. The resulting estimates appear in Table 4A.

The basic estimates of profits and interest payments utilized in this study are those shown in the 1918 report of the United States Commissioner of Internal Revenue on *Statistics of Income*. It shows on page 15 that interest payments by mining corporations were $67,010,715. A study of the reports of mining corporations as given in Moody's *Manual of Corporations Statistics* indicates that about 97 per cent of the net amount of interest paid by mining corporations goes to the bondholders. The

TABLE 4A

THE ESTIMATED AGGREGATE OF RENTS AND ROYALTIES DERIVED FROM THE LEASE OF MINERAL RIGHTS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Rents plus royalties; Census years (Thousands)	Gross value of mineral output according to Geological Survey (Thousands)	Ratio of B to C in 1909	Estimated total of rents and royalties (Millions) C × D
1909	$72,945[a]	$1,887,582[b]	.03865	$ 73[a]
1910		1,992,406[b]		77
1911		1,927,532[b]		74
1912		2,243,630[b]		87
1913		2,439,160[c]		94
1914		2,118,306[c]		82
1915		2,397,745[c]		93
1916		3,514,600[c]		136
1917		4,992,128[c]		193
1918		5,543,456[c]		214

[a] Includes the $64,155,000 reported as royalties and rent of mines and $8,790,000 representing an estimated rent for offices, the amount being one-fifth of the item entered as "Rent of offices and other sundry expenses." See the *Abstract of the United States Census* for 1910, p. 541.

[b] *Statistical Abstract of the U. S.*, 1913, p. 217.

[c] *Statistical Abstract of the U. S.*, 1919, p. 243.

total bond interest paid by corporations therefore apparently amounts to about $65,000,000.

On a previous page, the fact has been noted that corporate enterprises produce about 95 per cent of the entire output of the mining industry. If their funded debt represents the same percentage of the total, it appears that in 1918 the interest thereon for the entire mining industry must have been approximately $65,000,000, divided by 0.95 or $68,400,000.

The assumption has been made that the interest payments in the earlier years varied in the same ratio as did the similar payments made by 25 typical mining corporations, the records of which appear in Moody's *Manual of Corporation Securities*. Since the amount is relatively very small, its accuracy is a matter of but minor importance.

In 1918, the reported net income after the deduction of interest and taxes, was $304,939,703.[1] The percentage of the entire gross output of minerals produced by enterprises in the corporate form increased from 86.3[2] in 1902 to 91.4[3] in 1909. It seems probable, therefore, that, by

[1] *Statistics of Income*, 1918. p. 16.

[2] *U. S. Census of Mines and Quarries*, 1902. p. 67.

[3] *U. S. Census of Mines and Quarries*, 1909, p. 32.

TABLE 4B

AN ESTIMATE OF THE TOTAL INTEREST RECEIVED ON INVESTMENTS IN MINES, QUARRIES, AND OIL WELLS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Estimated interest total for 1918 (Thousands)	Interest on funded debt paid by 25 typical mining corporations [b] (Thousands)	Ratio of B to C in 1918	Estimated total interest on investments (Millions) C × D
1909		$5,496		$45
1910		5,974		49
1911		6,753		56
1912		6,876		57
1913		6,689		55
1914		7,392		61
1915		8,051		66
1916		7,809		64
1917		7,566		62
1918	$68,400 [a]	8,306	8.234	68

[a] For derivation, see the text.
[b] From Poor's and Moody's *Manuals of Corporation Securities.*

1918, corporations had come to control 95 per cent of the value of mineral products. If so, the total net income of the mining industry may be estimated as about $321,000,000, in 1918.

The reports of 110 mining and oil producing corporations cited in Moody's *Analyses of Industrial Investments* show that 71.72 per cent of net earnings after the deduction of interest charges were paid out as dividends. If this percentage is assumed to hold for all enterprises, the conclusion is that the total disbursed profits in 1918 amounted to 0.7172 × $321,000,000, or about $230,100,000. In earlier years, these disbursed profits have been estimated upon the basis of the aggregate reported dividends of the metal mining companies reported in the *Engineering and Mining Journal* and of a few coal and iron corporations for which continuous reports are given in Poor's or Moody's *Manuals.* These dividends, as reported, contain many duplications due to the existence of holding and interlocking companies and they also include payments made by some concerns engaged largely in manufacturing. The result is that their sum is decidedly larger than the net amount indicated by the reports of the Commissioner of Internal Revenue. The mode of reduction is indicated in Table 4C.

Not all of the profits of mining concerns are withdrawn from the business by the owners, a very considerable fraction being saved. In the case

of the 25 corporations studied, the records show the fraction of the total profits carried to surplus. The assumption is made that this fraction applies to all mineral producing enterprises. The estimates based upon this premise also appear in Table 4C. The reduction of these sums to a basis of purchasing power at the price level of 1913 is shown in Table 4D.

TABLE 4C

AN ESTIMATE OF THE DISTRIBUTED PROFITS AND BUSINESS SAVINGS OF ALL MINING CONCERNS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H
Calendar year	Distributed profits as indicated by reports of income tax[a] (Thousands)	Gross dividends of selected mining and oil producing corporations[b] (Millions)	Ratio of B to C in 1918	Estimated distributed profits of all concerns (Millions) C × D	Ratio of annual surplus to dividends in selected corporations	Estimated business savings of all concerns (Millions) E × F	Estimated total profits including savings[e] (Millions) E + G
1909..		$141		$ 88	.6236[c]	$ 55	$144
1910..		147		92	.3747[c]	35	127
1911..		151		95	.3646[c]	35	130
1912..		172		108	.5954[c]	64	173
1913..		200		125	.3364[c]	42	168
1914..		170		107	.3200[c]	34	141
1915..		187		117	.7996[c]	94	211
1916..		306		192	1.0878[c]	209	402
1917..		449		282	.5229[c]	147	429
1918..	$230,100	366	.6280	230	.3436[d]	79	309

[a] For derivation, see text.

[b] These items are the respective sums of the total dividends reported in the January numbers of *The Engineering and Mining Journal* for mines of metals other than iron and of the dividends of eight important coal and iron producing corporations as reported in Moody's *Manual of Corporation Securities*.

[c] Calculated from the records of 25 typical mining corporations as reported in Moody's *Manual of Corporation Securities*.

[d] Calculated from the records of 110 selected mining and oil corporations reported in Moody's *Analyses of Industrial Investments*, 1920. This ratio corresponds quite closely to one calculated from the reports of the 25 typical corporations for the same year.

[e] Mr. W. R. Ingalls, one of our Directors, in an unpublished study on *The Value of the Mines of the United States*, estimates the average annual net earnings of the mines in the years 1911 to 1913 at $330,000,000, and is therefore inclined to think that the figures in Column H are somewhat too low for the years mentioned. He reaches his result by using as a basis the reports of the U. S. Bureau of Internal Revenue on the total income, before deducting Federal taxes, of all mining corporations in 1916. Under the law at that time, each corporation had to report its income separately; hence if one corporation paid dividends to another corporation, this income was duplicated in the totals, making them too large. As Mr. Ingalls states, the $330,000,000 is the amount before any allowance is made for depletion. It also takes in the earnings of metallurgical works which we have attempted to exclude. For our purposes, taxes must be deducted; while Mr. Ingalls has used the income figures as they stand before taking out the tax payments. In view of the facts just cited, it is evident that there may be no real discrepancy between the estimates of Mr. Ingalls and the ones here presented.

TABLE 4D

AN ESTIMATE OF THE PURCHASING POWER OF THE BUSINESS SAVINGS OF CONCERNS OPERATING MINES, QUARRIES, AND OIL WELLS

A	B	C	D
Calendar year	Estimated total savings [a] (Millions)	Index of construction costs [b] (Base, 1913)	Equivalent of savings measured in new construction at prices of 1913 (Thousands) B ÷ C
1909	$ 55	.927	$ 59
1910	35	.953	36
1911	35	.945	37
1912	64	.983	66
1913	42	1.000	42
1914	34	.960	36
1915	94	.992	94
1916	209	1.194	175
1917	147	1.473	100
1918	79	1.499	53

[a] See Table 4C, Column G.

[b] Based upon Bureau of Labor Statistics indices, combined after weighting as follows: union scale of wages, 3; wholesale prices of metals and metal products, 2; lumber and building materials, 1.

The notable feature brought out by Tables 4C and 4D is the enormous increase in savings during the period immediately preceding the entrance of the United States into the war and the sharp decline thereafter. The figures in the last column of Table 4D show that this increase remains very large even after values are corrected for changes in the price level.

Table 4E summarizes the disbursements to the entrepreneurs and owners of property used in the mining industry.

It is evident that the revenues derived from mining increased materially during the latter years of the decade under consideration. Since this increase is presumably due primarily to war conditions, it is doubtful that it represents any permanent tendency. In fact available reports of mining corporations indicate that in 1919 and 1920 the earnings of many companies are much lower and in some instances heavy deficits have

The Census of 1909 indicates that our estimates are more likely to be too high than too low, for it shows total returns to entrepreneurs and investors of only $164,218,893; and from this amount an allowance for depletion must be deducted to arrive at the net gain. Both the dividends shown in Column C and the value of mineral output as estimated by the U. S. Geological Survey (see Table 4A, Column C) point to an increase from 1909 to 1913 of something less than one-third over the 1909 figures; and this increase corresponds with the estimates recorded in Column E. Corporate savings increased less rapidly than dividend payments. There appears, then, to be no sufficient reason for modifying the estimates here presented.

TABLE 4E

AN ESTIMATE OF THE TOTAL REVENUES DERIVED BY ENTREPRENEURS AND PROPERTY OWNERS FROM MINES, QUARRIES, AND OIL WELLS

A	B	C	D	E	F	G
Calendar year	Profits withdrawn [a] (Millions)	Total rents and royalties [b] (Millions)	Interest [c] (except on bank loans) (Millions)	Total revenues withdrawn by entrepreneurs and other property owners (Millions) B + C + D	Indices of prices of consumption goods used by well-to-do classes [d]	Value of revenues withdrawn at price of 1913 (Millions) E ÷ F
1909	$ 88	$ 73	$45	$207	.965	$214
1910	92	77	49	219	.983	222
1911	95	74	56	225	.990	227
1912	108	87	57	251	1.000	251
1913	125	94	55	275	1.000	275
1914	107	82	61	249	1.011	247
1915	117	93	66	276	.999	276
1916	192	136	64	392	1.081	363
1917	282	193	62	537	1.225	438
1918	230	214	68	512	1.406	364

[a] See Table 4C, Column E.
[b] See Table 4A, Column E.
[c] See Table 4B, Column E.
[d] Simple arithmetic average of indices for classes spending respectively $5,000 and $25,000 per annum.

occurred. There is also, of course, a question as to whether in calculating the profits reported, sufficient allowances were made for exhaustion of the properties. A failure to make such deductions would necessarily exaggerate the nominal profits to an equal amount.

§ 4c. Total Wages and Salaries

The share of the value product which requires the greatest amount of labor to estimate is that going to the employees. To arrive at figures having any validity whatever, it was necessary to depend mostly upon State reports and many of these are very incomplete. The process followed is summarized in Tables 4F and 4G for the coal mining industry while all other mines are dealt with in Table 4H.

TABLE 4F

AN ESTIMATE OF TOTAL WAGES AND SALARIES PAID IN THE BITUMINOUS COAL INDUSTRY[e] OF THE CONTINENTAL UNITED STATES

(Values in Millions of Dollars)

A	B	C	D	E	F	G	H
Calendar year	Estimated total payments to employees based upon reports from: Pennsylvania Department of Internal Affairs[a]	Kansas and West Virginia Bureau of Mines, and Ohio[c] estimates[b]	Michigan Department of Labor[d]	Index of total wages paid $B+C+\frac{D}{2}$	Total wages and salaries paid in Census years	Ratio of F to E	Total salaries and wages paid E × G
1909	$277	$319	$ 457	$ 825	$290[f]	.3515	$290
1910	337	348	538	954			335
1911	328	338	561	947			333
1912	370	365	593	1,032			363
1913	398	409	681	1,148			404
1914	355	359	630	1,029			362
1915	319	357	634	993			349
1916	434	416	723	1,212			426
1917	613	547	889	1,604			564
1918	865	634	1,211	2,104			740

[a] Product of the total value of bituminous coal produced in the U. S. (as shown by the *Statistical Abstract*), and the ratio of wage and salary payments to the value of the coal produced (as indicated by the Pennsylvania reports for each year).

[b] Obtained by calculating an average full time annual wage for miners in each of the three States, computing the mean of the three averages and multiplying it by the estimated number of full time employees in the United States as reported by the U. S. Bureau of Mines.

[c] Wages in the Hocking Valley field estimated from data in the *Monthly Labor Review* for December, 1919, pp. 225–226.

[d] The product of the number of tons mined (as reported by the U. S. Geological Survey) times the cost per ton of mining coal in Michigan. Since Michigan rates are apparently abnormally high, and that state is a relatively small producer, this estimate is only given one-half the weight of the other two.

[e] Includes the small fields in the West producing anthracite.

[f] To the $315,997,000 in wages reported in the Census of Mines and Quarries for 1909, p. 183, $159,000 has been added to cover the wages of Western anthracite mines, and $12,108,000 has been deducted to pay for the cost of powder purchased by the miners. Since the Census estimates that 4.72 per cent of the bituminous miners were already counted in manufacturing (Census of Mines, 1909, p. 17) the remainder just obtained has been multiplied by 0.9528.

TABLE 4G

AN ESTIMATE OF TOTAL WAGES AND SALARIES PAID IN THE ANTHRACITE FIELD AND IN ALL COAL MINES

A	B	C	D	E	F
Calendar year	Average payments to employees per long ton mined	Total long tons mined[e] (Thousands)	Total wages and salaries in the anthracite industry (Millions) B × C	Total wages and salaries in the bituminous industry[f] (Millions)	Total wages and salaries in the coal mining industry (Millions) D + E
1909.....	$1.240[a]	72,384	$ 90	$290	$380
1910.....	1.254[a]	75,433	95	335	430
1911.....	1.250[a]	80,771	101	333	434
1912.....	1.345[a]	75,323	101	363	464
1913.....	1.340[b]	81,719	109	404	513
1914.....	1.340[b]	81,090	109	362	470
1915.....	1.330[c]	79,460	106	349	455
1916.....	1.548[d]	78,195	121	426	548
1917.....	1.468[d]	88,939	131	564	695
1918.....	1.919[d]	88,238	169	740	909

[a] *Annual Report* of Pa. Secretary of Internal Affairs, Part III.
[b] Interpolated.
[c] *Annual Report* of Pa. Commissioner of Labor and Industry, Part I.
[d] Pa. Department of Internal Affairs, *Report on Productive Industries.*
[e] *Statistical Abstract of United States.*
[f] See Table 4F, Column H.

Statistics pertaining to the mines of stone, metals, and miscellaneous minerals are very scattered and disjointed; hence the estimates presented in Table 4H represent a combination pieced together from various sources. The fundamental assumption involved is that wages are roughly proportional to the value of output.

TABLE 4H

AN ESTIMATE OF TOTAL WAGES AND SALARIES FOR ALL EMPLOYEES OF MINES, QUARRIES, AND OIL WELLS EXCEPT COAL MINES

A	B	C	D	E	F	G	H
Calendar year	Index of daily wages [a]	Days of labor performed in metal mines and quarries of the U. S. [b] (Thousands)	Ratio of value of mineral products (except coal) to value of metal and quarry products [d]	Index of total wages paid in metal mines and quarries $\frac{B \times C \times D}{1{,}000}$	Estimated wages and salaries in Census year (Thousands)	Ratio of F to E	Total wages and salaries paid (Millions) $\frac{E \times G}{1{,}000}$
1909 ...	.905	67,680 [c]	1.330	81 [e]	$232,148 [f]	2.851	$232
1910 ...	.910	71,000 [c]	1.334	86			246
1911 ...	.951	71,152 [b]	1.369	93			264
1912 ...	.980	76,650 [b]	1.341	101			287
1913 ...	1.000	81,220 [b]	1.378	112			319
1914 ...	.953	63,242 [b]	1.447	87			249
1915 ...	.998	67,333 [b]	1.418	95			272
1916 ...	1.153	80,673 [b]	1.307	122			347
1917 ...	1.387	79,083 [b]	1.333	146			417
1918 ...	1.568	72,088 [b]	1.382	156			445

[a] Estimated on the basis of wages in the iron mines of Itasca and St. Louis Counties Minn. (*Biennial Reports* of Minn. Bureau of Labor), in miscellaneous mines in Pa. (Reports of Secretary of Internal Affairs and of Commissioner of Labor and Industry), in the gold mines of the U. S. (U. S. Bureau of Mines, Bulletin 144, p. 62), and in Tenn. metal mines and quarries (*Annual Reports* of Tenn. Mining Department).

[b] See U. S. Bureau of Mines, *Technical Papers* 245 and 252.

[c] Estimated as being proportional to the value of metal and quarry products.

[d] Based upon reports of the *U. S. Geological Survey* and the *U. S. Census of Mines and Quarries*.

[e] 81 thousands equals the product of B, C, and D in 1909.

[f] $43,716,537, duplicated in the Census of Mfg., (see *Census of Mines and Quarries*, 1909, p. 17) has been added to $379,720,000, the total wages in coal mining (see Table 4G), and the sum has been deducted from $655,584,467, the amount reported in the *Census of Mines and Quarries* for 1909.

§ 4d. Number of Employees and Average Earnings

We are interested not only in the total wages and salaries paid, but also in the total number of persons required to operate the mines, quarries, and oil wells of the United States.

The United States Bureau of Mines in connection with its statistics of mine accidents shows the number of men at work in the principal classes of mines and quarries each year. These numbers have been compared with the numbers in 1909 working in the maximum month in each industry as shown by the United States Census of Mines and Quarries. After considering these quantities and making allowances for the number of workers in miscellaneous industries not covered by the reports of the Bureau of

Mines, the figures entered in Table 4I have been arrived at. They must be regarded merely as rough approximations to the truth.

TABLE 4I

TOTAL NUMBER OF EMPLOYEES ATTACHED TO THE INDUSTRY AND TOTAL AND AVERAGE WAGES PAID IN THE MINES, QUARRIES, AND OIL WELLS OF THE CONTINENTAL UNITED STATES

A	B	C	D	E	F	G	H	I	J
Calendar year	Wages and salaries (Millions)			Employees attached to industry[c] (Thousands)			Ratio of total share of employees to total wages and salaries[d]	Total share of employees (Millions) 1.050×D	Average annual compensation per employee I ÷ G
	Of coal miners[a]	Of other miners[b]	Of all miners B + C	Coal mines	Other mines	All mines E + F			
1909	$380	$232	$ 612	725	348	1,073	1.050	$ 643	$ 599
1910	430	246	676	740	366	1,106		711	642
1911	434	264	698	751	381	1,132		733	647
1912	464	287	752	759	391	1,150		790	687
1913	513	319	832	764	395	1,159		874	755
1914	470	249	719	767	396	1,163		755	649
1915	455	272	727	771	392	1,163		764	656
1916	548	347	894	774	380	1,154		939	814
1917	695	417	1,112	776	365	1,141		1,169	1,025
1918	909	445	1,354	779	329	1,108		1,422	1,283

[a] Table 4G, Column F.
[b] Table 4H, Column H.
[c] For derivation, see text.
[d] Part of mining is done under contract, the *Census of Mines and Quarries*, for 1909, p. 21, showing $30,690,000 for contract work, being 5 per cent of the wage bill of 612 millions. The total pay of employees evidently amounts therefore to 105 per cent of the wages and salaries paid.

§ 4e. Total Net Value Product and Share of Employees

We are now in a position to estimate the total net value product of the industry, and the estimates thereof for the various years are recorded in Table 4J.

The results indicate that the share of the value product going to the employees tends to be a little less than three-fourths of the whole and that their relative share diminished materially in 1916 and 1917, but showed signs of recovery in 1918.

To some of the employees, however, the average purchasing power of their annual earnings is a matter of as much interest as is the relative size of their share of the value product.[1] The employers' direct interest, on

[1] Dr. H. W. Laidler, a Director of the Bureau says: "An increasing number of progressive employees feel that the question of the proportion of the return to employees is of greater importance than the actual size of that return."

TABLE 4J

AN ESTIMATE OF THE NET VALUE PRODUCT OF THE MINES, QUARRIES, AND OIL WELLS OF THE CONTINENTAL UNITED STATES AND THE PER CENT THEREOF GOING TO THE EMPLOYEES

Calendar year	Millions of dollars					
	A	B	C	D	E	F
	Rents and royalties [a]	Profits [b] (including savings)	Interest on funded debt [c]	Compensation of employees [d]	Total net value product A + B + C + D	Per cent of Value product going to employees $\frac{100\ D}{E}$
1909....	$ 73	$144	$45	$ 643	$ 904	71.0
1910....	77	127	49	711	964	73.7
1911....	74	130	56	733	993	73.8
1912....	87	173	57	790	1,106	71.4
1913....	94	168	55	874	1,191	73.4
1914....	82	141	61	755	1,039	72.7
1915....	93	211	66	764	1,133	67.4
1916....	136	402	64	939	1,541	60.9
1917....	193	429	62	1,169	1,853	63.1
1918....	214	309	68	1,422	2,013	70.6

[a] See Table 4A, Column E.
[b] See Table 4C, Column H.
[c] See Table 4B, Column E.
[d] See Table 4I, Column I.

the other hand, centers mainly upon questions pertaining to the efficiency of the workers in producing output. Table 4K throws light upon the situation in both these connections.

§ 4f. The Mineral Output Compared to Earnings and Population

As a measure of the output of the mining industry, the index of physical production prepared by Professor Edmund E. Day has been used, as it is presumably the best criterion available. It is possible that it exaggerates a trifle the expansion of the mining industry during the war years, for it is based upon data concerning the production of leading minerals, and some of the minor industries producing materials for building apparently declined while the larger fields were expanding. However, the minerals covered include such a large proportion of the total that it is improbable that any error from this source is large enough to be a matter of serious moment and, at any rate, its effect would not be either continuous or cumulative; hence, it seems that the figures are amply accurate for the purposes at hand.

TABLE 4K

AN ESTIMATE OF THE PURCHASING POWER OF THE EARNINGS OF THE AVERAGE EMPLOYEE COMPARED WITH THE AVERAGE OUTPUT PER EMPLOYEE

A	B	C	D	E	F	G
Calendar year	Average annual earnings per employee[a]	Index of prices of goods purchased by workers[b]	Average earnings at prices of 1913 $\frac{B}{C}$	Index of physical production of minerals[d]	Total number of employees attached to industry[c] (Millions)	Index of output per employee $\frac{E}{F}$
1909....	$ 599	.955	$627	675	1.073	629
1910....	642	.978	656	717	1.106	648
1911....	647	.984	658	692	1.132	611
1912....	687	.994	691	771	1.150	670
1913....	755	1.000	755	809	1.159	698
1914....	649	1.01	643	721	1.163	620
1915....	656	1.03	637	810	1.163	696
1916....	814	1.10	740	950	1.154	823
1917....	1,025	1.29	795	986	1.141	864
1918...	1,283	1.58	812	995	1.108	898

[a] See Table 4I, Column J.
[b] Bureau of Labor Statistics index extended back by special investigation.
[c] See Table 4I, Column G.
[d] Day, Edmund E., Review of Economic Statistics, 1921. *An Index of the Physical Volume of Production*, p. 22; multiplied by a suitable factor to make comparison easy.

Table 4K shows a sharp gain in the purchasing power of the average miner's wage beginning with the year 1916. At the same time, a marked increase in physical output is noticeable; in fact the production appears to have increased to a considerably greater extent than the earnings. Further investigation would be necessary in order to determine whether the larger output was the result mainly of a smaller number of days lost per year, more strenuous effort put forth, or an improvement in mining machinery.

Another subject of general interest is the relation between the output of minerals and the population of the country.

According to Professor Day's index, our mineral output increased during the decade far more rapidly than population. This fact is brought out in Table 4L.

Table 4L indicates that the exploitation of our mineral resources is proceeding more rapidly than is our growth in population. The large increase in output in 1916, 1917, and 1918 presumably was called forth mostly in response to war requirements and hence may have added little or nothing to the permanent national industrial equipment.

TABLE 4L

THE RELATIVE CHANGES IN THE PER CAPITA PRODUCTION OF MINERALS IN THE CONTINENTAL UNITED STATES

A	B	C	D	E
Calendar year	Population of the United States		Day's index of physical production of minerals[b]	Index of per capita physical production of minerals $\frac{100D}{C}$
	Thousands[a]	Index		
1909	90,370	100.0	100.0	100.0
1910	92,229	102.1	106.4	104.2
1911	93,811	103.8	102.6	98.8
1912	95,338	105.4	114.4	108.4
1913	97,278	107.7	119.9	111.3
1914	99,194	109.8	107.0	97.4
1915	100,428	111.1	120.1	108.1
1916	101,722	112.5	140.9	125.2
1917	103,059	114.1	146.4	128.3
1918	104,182	115.3	147.6	128.0

[a] See Sec. 2a.

[b] Adjusted from the figures on p. 22 of Edmund E. Day's, *An Index of the Physical Volume of Production*, Harvard Committee on Economic Research, 1921.

It is well to keep in mind that while an increase in mineral output is a necessary concomitant of industrial progress, it nevertheless is far from representing a clear gain since it necessarily involves a diminution in the inventory of resources upon which the nation must depend in the future.