TABULAR ESTIMATE

SHOWING THE APPROXIMATE QUANTITY, PAST AND FUTURE, PRODUCTION OF COAL IN THE SEVERAL DISTRICTS OF THE NORTHERN ANTHRACITE COAL BASIN OF PENNSYLVANIA.

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DISTRICTS.	NAMES OF THE COAL BEDS.	DESCRIPTIVE REMARKS.	Average thickness of beds.	Approximate workable area of bed in acres.	Approximate quantity of solid coal originally in place before any was mined. 23·4% of contents of all beds deducted for refuse, faults, thin coal etc., leaves 1,400 tons per ft. per acre, good coal. 2,240 lbs. per ton.	Approximate area of mine workings to January 1, 1892, in acres.	Equivalent area for bed 1 foot thick.	Approximate number of tons produced to January 1, 1892—826 tons per foot thickness of bed per acre.	Approximate quantity of coal wasted (including culm or wasted coal at 20 per cent. of production)—165·2 tons per foot per acre.	Approximate quantity of coal remaining in worked areas, (pillars, gob, etc.)—408·8 tons per foot per acre.	Approximate area from which no coal has been mined—the unworked areas.	Approximate quantity of solid coal in place in the unworked areas—1,400 tons per foot per acre.	Approximate future production for unworked areas, based upon the present yield per foot per acre, and present prices, mining methods, etc.; including, however, the thin seams as minable.	Production for past five years and percentage of total produced by each district.	Approximate time required to exhaust the coal at about present rates of production. Approximate percentage of the minable coal possessed by each district.
Forest City and Carbondale District. From extreme Northeastern end of basin to Powderly Slope, two miles South West of Carbondale Station, D. & H. R. R.	Top Coal	Known as Slope Bed at Forest City.	6·85	6,700	64,253,000	2,010	13,770	11,374,026	2,274,805	5,629,167	4,690	44,976,400	Factor 900 tons per acre. 28,913,400	1887— 886,845	1,200,000 tons per year. About 70 years.
	Bottom Coal or Shaft Bed	Principal beds of district.	6·63	6,800	63,117,600	2,230	13,688	11,471,488	2,294,297	5,595,654	4,570	42,418,600	27,269,100	1888—1,024,823	3½% of future production.
	Clifford Bed, Dunmore, or Third Bed	Only workable over portions of area with an outcrop.	4·1	7,490	42,992,600	155	634	523,684	104,736	259,179	7,335	42,102,200	27,065,700	1889— 872,187 1890—1,016,220 1891—1,009,818	
Production, 1891, 1,009,818 tons.		Totals	**17·58**	**20,990**	**170,363,200**	**4,395**	**28,092**	**23,369,198**	**4,673,838**	**11,484,000**	**16,595**	**129,497,200**	**83,248,200**	Past production 6% of whole production.	
Jermyn District. From Carbondale District to ¾ mile South West of Jermyn Station, D. & H. R. R.	Diamond	Not Worked.	5·0	10	70,000						10	70,000	45,000		1,400,000 tons per year, excluding New County bed, 14 years; including New County bed, 19 years. 1⅙% of future production.
	Rock	Not Worked.	5·8	70	568,400						70	568,400	365,400		
	Grassy Island	Good.	9·0	700	8,820,000	90	810	669,060	133,812	331,128	610	7,686,000	4,941,000		
	New County	Not Worked.	3·0	2,500	10,500,000						2,500	10,500,000	6,750,000	1887— 739,201 1888— 897,935 1889—1,044,338 1890— 986,318 1891—1,381,817	
	Archbald	Principal bed of disrtict.	8·7	3,040	37,027,200	1,680	14,616	12,072,816	2,414,563	5,975,020	1,360	16,564,800	10,648,800		
	Dunmore	Very thin and sometimes absent.	2·0	2,000	5,600,000						2,000	5,600,000	3,600,000		
Production, 1891, 1,381,817 tons.		Totals	**33·5**	**8,320**	**62,585,600**	**1,770**	**15,426**	**12,741,876**	**2,548,375**	**6,306,148**	**6,550**	**40,989,206**	**26,350,200**	Past production 3% of whole.	
Archbald District. From Jermyn District to Winton Station, D. & H. R. R. Includes S. V. White and Eaton Collieries.	New County Bed	Small area, thin and divided.													550,000 tons per year. Archbald bed only, 21 years; including thin beds 36 years. ·00⅘% of production.
	Archbald	Principal bed of district.	8·0	3,100	34,720,000	1,470	11,760	9,713,760	1,942,752	4,807,488	1,630	18,256,000	11,736,000	1887— 470,538 1888— 505,775 1889— 424,788 1890— 455,925 1891— 540,961	
	Dunmore or Red Ash	Very thin over large part of the area within the outcrop.	3·0	3,300	13,860,000						3,300	13,860,000	8,910,000		
Production, 1891, 540,961 tons.		Totals	**11·0**	**6,400**	**48,580,000**	**1,470**	**11,760**	**9,713,760**	**1,942,752**	**4,807,488**	**4,930**	**32,116,000**	**20,646,000**	Past production 2% of whole.	
Peckville, Olyphant, and Priceville District. From Archbald District to Dickson Station, D. & H. R. R.	Olyphant, No. 1	Very clean.	8·0	335	3,752,000	325	2,600	2,147,600	429,520	1,062,880	10	112,000	72,000		At 1,400,000 tons per annum, excluding the thin beds, 75 years; including the thin beds, 140 years. 8⅛% of future production.
	Olyphant, No. 2		7·5	350	3,675,000	225	1,687	1,393,462	278,692	789,645	125	1,311,800	843,300		
	Coal Bed	Thin, not workable at present.	2·5	1,800	6,300,000						1,800	6,300,000	4,050,000		
	Coal Bed	Thin, not worked.	3·0	2,000	8,400,000						2,000	8,400,000	5,400,000	Past production 4% of whole.	
	Diamond	Thin, not worked.	3·5	2,800	13,720,000	25	87	71,862	14,372	35,560	2,775	13,652,800	8,776,800		
	Rock	Often contains dividing stratum of rock	5·0	3,700	25,900,000						3,700	25,900,000	16,650,000		
	Grassy Island	Principal bed of district.	9·0	4,500	56,700,000	1,650	14,850	12,266,100	2,453,220	6,070,680	2,850	35,910,000	23,085,000		
	New County	Sometimes double this thickness. Rock or slate parting.	3·6	6,500	32,760,000	1	3	2,973	594	1,471	6,499	32,754,400	21,056,400		
	Clark	Usually divided, rock parted, and not much worked at present.	7·0	7,700	75,460,000	170	1,190	982,940	196,588	486,472	7,530	73,794,000	47,439,000		
	Dunmore, No. 1	Only one bed workable at present.	4·0	9,600	53,706,000	130	520	429,520	85,904	212,576	9,470	53,032,000	34,092,000	1887— 876,039 1888—1,135,825 1889—1,020,523 1890— 936,017 1891—1,301,590	
	Dunmore, No. 2		2·0	10,000	28,000,000						10,000	28,000,000	18,000,000		
	Dunmore, No. 3		2·5	10,700	37,450,000						10,700	37,450,000	24,075,000		
Production, 1891, 1,301,590 tons.		Totals	**57·6**	**59,985**	**345,877,000**	**2,526**	**20,937**	**17,294,457**	**3,458,890**	**8,659,284**	**57,459**	**316,517,000**	**203,539,500**		
Scranton District. From Priceville District to ½ mile North East of Moosic Station, D. & H. R. R. Includes Pancoast and Sibley Collieries.	Brisbin	Thin Cover.	8·9	40	498,400						40	498,400	Factor 800 tons per acre. 284,000		6,300,000 tons per annum, excluding two thin beds, 53 years; including two thin beds, 61 years. 16% of future productcion.
	Richmond		5·0	2,380	16,600,000	320	1,600	1,321,000	264,200	654,080	2,060	14,420,000	8,240,000	Past production 31% of whole.	
	Church Slope		3·5	5,000	24,500,000	30	105	86,730	17,346	42,924	4,970	24,353,000	13,916,000		
	Diamond		9·4	7,700	101,332,000	2,890	27,966	23,099,916	4,619,983	11,432,500	4,810	63,299,600	36,171,200		
	Rock		6·4	7,760	69,529,600	1,380	8,832	7,295,232	1,459,046	3,610,521	6,380	57,164,800	32,665,600		
	Big	Principal bed of District.	11·7	9,200	150,696,000	4,425	51,772	42,763,672	8,552,734	21,164,393	4,775	78,213,800	44,693,600		
	New County	Large area divided and thin.	6.9	9,330	90,127,800	1,150	10,935	6,554,310	1,310,862	3,243,756	8.180	79,018,800	45,153,600		
	Clark	Often in two parts, separated by rock.	7·3	15,180	155,139,600	2,700	19,710	16,280,460	3,256,092	8,057,448	12,480	127,545,600	72,883,200		
	Dunmore, No. 1	Large area not workable.	4·0	10,000	56,000,000	800	3 200	2,643,200	528,640	1,308,160	9,200	51,520,000	29,440,000	1887—5,871,260 1888—6,620,634 1889—5,643,260 1890—5,960,379 1891—6,193,390	
	Dunmore, No. 2		4·8	19,700	132,384,000	1,960	9,408	7,771,008	1,554,201	3,845,990	17,740	119,212,800	68,121,600		
	Dunmore, No. 3	Large area not workable.	3·9	12,000	65,520,000	645	2,496	2,061,696	412,339	1,020,364	11,355	61,997,600	35,427,200		
Production, 1891, 6,193,390 tons.		Totals	**71·8**	**98,290**	**862,327,400**	**16,300**	**136,024**	**119,877,224**	**21,975,444**	**54,379,536**	**81,990**	**677,244,400**	**386,996,000**		
Pittston District. From Scranton District to ½ mile North East of Plainsville Station, L. V. R. R. Includes Keystone Colliery.	Hillman		7·2	800	8,064,000	5	36	29,736	5,947	14,717	795	8,013,600	4,579,200		At 4,000,000 tons per year, excluding thin bed, 81 years; including thin bed, 83 years. 14% of future production.
	Coal Bed. (?)		3·5	2,400	11,760,000						2,400	11,760,000	6,720,000	Past production 16% of whole.	
	Checker or 7 ft.		6·8	6,348	60,407,760	1,120	7,616	6,290,816	1,258,163	3,113,420	5,228	49,770,000	28,440,000		
	Pittston or 14 ft.	Principal bed of District.	11·2	8,080	126,694,400	3,810	42,672	35,247,072	7,049,414	17,444,313	4,270	66,953,600	38,259,200		
	Marcy	Sometimes divided by rock.	7·0	12,700	124,460,000	1,300	9,100	7,516,600	1,503,320	3,720,080	11,400	111,720,000	70,840,000	1887—2,514,170 1888—2,838,653 1889—2,357,976 1890—2,963,473 1891—3,777,802	
	4 ft. or 4th Bed	Known also as Checker Bed. Often carries considerable refuse.	5·4	8,000	60,480,000	20	108	89,208	17,841	44,150	7,980	60,328,800	34,473,600		
	Powdermill or Red Ash	Generally divided by thick rock parting.	10·1	19,800	279,972,000	1,700	17,170	14,182,420	2,836,484	7,019,096	18,100	255,934,000	146,248,000		
Production, 1891, 3,777,802 tons.		Totals	**51·2**	**58,128**	**671,838,160**	**7,955**	**77,026**	**63,355,852**	**12,671,169**	**31,355,776**	**50,173**	**564,480,000**	**329,560,000**		
Wilkes-Barre and Plymouth District. From Pittston District to ½ mile North East of Warrior Run Station, L. V. R. R. Includes Avondale and Maffet Collieries.	Auble or New		3·7	500	2,590,000	1	4	3,304	661	1,635	499	2,584,400	Factor 700 tons per acre. 1,292,200		At 7,500,000 tons per year, excluding thin beds, 127 years; including thin beds, 134 years. 42% of future production.
	Snake Island or K Bed		7·4	4,000	41,400,000	10	74	6,112	1,222	3,025	3,990	41,336,400	20,668,200		
	Abbott, 7 ft., or Huchinson		5·2	9,200	66,976,000	250	1,300	1,073,800	214,760	531,440	8,950	65,156,000	32,578,000		
	Thin Coal Bed	Only limited area.	2·9	5,000	20,300,000						5,000	20,300,000	10,150,000	Past production 32% of whole.	
	Lance, Kidney, or Bowkley		6·3	11,000	97,020,000	600	3,780	3,024,000	604,800	1,545,264	10,400	91,728,000	45,864,000		
	Hillman		10·0	13,800	193,200,000	1,190	11,900	9,829,400	1,965,880	4,864,720	12,610	176,540,000	88,270,000		
	Lodgment	Workable for small area only.	4·3	4,000	24,080,000						4,000	24,080,000	12,040,000		
	G or Old Bennett		5·9	15,300	126,378,000	40	236	194,936	38,987	96,476	15,260	126,047,600	63,023,800		
	5 ft. to 6 ft. or Lance		5·8	19,800	160,776,000	275	1,595	1,317,470	263,494	652,036	19,525	158,543,000	79,271,500		
	Cooper	These two beds often unite and form the Baltimore. Principal bed of district.	9·1	21,500	273,910,000	5,160	46,956	38,785,656	7,757,131	19,195,612	16,340	208,171,600	104,085,800	1887—7,361,877 1888—8,177,987 1889—6,760,601 1890—6,510,451 1891—7,312,687	
	Bennett		8·5	22,000	261,800,000	5,180	44,036	36,373,736	7,274,747	18,001,916	16,820	200,158,000	100,079,000		
	Checker	Workable for limited area.	4·5	12,000	75,600,000						12,000	75 600,000	37,800,000		
	Ross	Often split or divided into Upper and Lower Ross.	10·0	25,000	350,000,000	1,020	10,404	8,593,704	1,718,741	4,253,155	23,980	335,720,000	167,860,000		
	Red Ash	Often split or divided into Top and Bottom Red Ash	14·0	26,772	524,731,200	1,940	26,931	22,245,006	4,449,001	11,009,392	24,832	486,707,200	243,353,600		
Production, 1891, 7,312,687 tons.		Totals	**97·6**	**189,872**	**2,218,761,200**	**15,666**	**147,216**	**121,447,124**	**24,289,424**	**60,154,671**	**174,206**	**2,012,672,200**	**1,006,336,100**		
Nanticoke and Mocanaqua District. From Wilkes-Barre and Plymouth District to South West end of basin. Includes Chauncy and Warrior Run Collieries.	George		6·6	2,400	22,176,000						2,400	22,176,000	11,088,000	Past production about 6% of whole.	At 2,300,000 tons per year, excluding thin beds, 121 years; including thin beds, 138 years. 14% of future production.
	Mills		6·7	4,000	37,520,000						4,000	37,520,000	18,760,000		
	Hillman		6·2	5,200	45.136,000	180	1,116	921,816	184,363	456,220	5,020	43,598,800	21,799,400		
	G		2·5	5,500	19,250.000						5,500	19,250.000	9,625,000		
	Lance or 4 ft.		4·0	6,000	33,600,000						6,000	33,600,000	16,800,000	1887—2,240,304	
	Cooper		7·3	7,500	76,650,000						7,500	76,650,000	38,325,000	1888—2,656,071	
	Bennett or Forge		7·9	8,000	88,480,000	550	4,345	3,588,970	717,794	1,776,236	7,450	106,075.200	53,037,600	1889—2,379,610	
	Ross	Frequently divided into Upper and Lower Ross.	6·6	12,100	111,804,000	620	4,224	3,489,024	697,805	1,726,771	11,480	80,875,200	40,437,600	1890—2,176,412	
	Red Ash or Buck Mt.	Often split into Upper and Lower Red Ash. Principal bed of District.	13·2	13,250	244,860,000	1,600	21,120	17,445,120	3,489,024	8,633,856	11,650	215,292,000	107,646,000	1891—2,111,018	
Production, 1891, 2,111,018 tons.		Totals	**61·0**	**63,950**	**679,476,000**	**2,950**	**30,805**	**25,444,930**	**5,088,986**	**12,593,083**	**61,000**	**635,037,200**	**317,518,600**		
Total production, 23,629,083 tons.		Grand Total		**505,935**	**5,057,808,560**	**53,032**	**467,287**	**383,244,421**	**76,648,478**	**189,739,986**	**452,903**	**4,408,073,200**	**2,374,194,600**		At 24,000,000 tons per year the whole basin will be exhausted in about 99 years.

EXPLANATION OF TABULAR ESTIMATE.

Showing the Approximate Quantity, Past and Future, Production of Coal in the Several Districts of the Northern Anthracite Coal Basin of Pennsylvania.

Editors "The Colliery Engineer":

SIRS:—I herewith offer for publication an estimate of the approximate quantity and past and future production of coal in the several districts of the Northern Anthracite Coal Basin, more generally known as the Wyoming and Lackawanna Coal Fields.

In making this estimate it was found most convenient to divide the region into districts as shown in Column No. 1 of the table, this will serve to show the distribution of the coal. Column No. 2 gives the local names applied to the various beds in each district, and are arranged with reference to their relative positions in the measures.

Column No. 3 contains short descriptive remarks as to known peculiarities of the individual beds. Column No. 4 contains the average thickness of the individual coal beds in each district and includes all beds that average over two feet thick. While these thin beds are not worked at the present time, they cannot be disregarded in an estimate of this sort, as the time will doubtless come when they will be profitably mined. The items in this column were obtained by taking the average thickness of each bed as found by using all the bore-hole, shaft, and other sections in the different parts of the basin, as published in the atlases of the State Geological Survey of the region.

The number of columnar sections of the measures thus used was 352, about evenly distributed throughout the basin. The totals in this column show the aggregate thickness of coal beds at the deepest point of the measures for each district. The items given in this column includes whatever slate, bone, and other refuse there may be in the beds.

Column No. 5 contains the approximate superficial area of workable coal in each bed, and was obtained from the published maps of the Geological Survey, which very correctly show the outcrops of the lowest coal bed and one other bed that is the most worked in each locality.

The outcrops of all the other beds were sketched approximately upon these maps by the author from his personal knowledge of the geology of the region, aided by the published cross sections and columnar sections. The area of each bed was then computed for each district, deductions were occasionally made from the areas thus found, in order to allow for those areas where certain beds are known to be too thin to be included in the table.

Owing to the prevailing flatness of the measures in this region, no account has been taken of the greater area of coal caused by steeper dips at the margin of the basin, or on the sides of the anticlinals. The actual area of the coal beds will therefore be somewhat in excess of the items given in the table, but this increase of area will doubtless be more than counter-balanced by the loss caused by poor and unminable coal on the outcrops, anticlinals, faults, troubles of various kinds, etc. The totals in this column show the area that would be covered if the beds were spread out side by side upon a level surface.

Column No. 6 contains the approximate quantity of solid coal in the ground before any was mined. The items are obtained by multiplying the thickness of each bed as is given in Column 4 by the items in Column 5, and this product by the factor 1,400, as being the number of tons of pure coal per foot per acre in the average coal bed after deducting 23-4% for the slate, bone, and other refuse, including an allowance for rock, and dirt faults, etc., which always occur in greater or less degree in all large areas.

In order to arrive at an average percentage for the refuse, the author obtained bed sections in various parts of the region from as many coal beds as possible, and from them ascertained the following facts:

	No. of bed sections.	Total thickness of beds.	Total thickness of refuse.	Per cent. of refuse.
Wilkes-Barre and Plymouth District	61	593·01 feet	115·1 feet	19·4%
Pittston District	28	236·91 "	43·3 "	18·4%
Scranton District	33	322·72 "	57·5 "	17·8%
Total	122	1152·64 "	21·59 "	18·7%

The above would seem to show that the refuse material in the average coal bed will amount to 18·7% of the contents of the bed.

The frequent occurrence of troubles, such as thin and poor coal, various kinds of faults, slips, squeezes, etc., etc., would seem to call for an allowance in addition to those referred to under Column 5, an arbitrary deduction of 4·7% is therefore made on this account. Therefore taking specific gravity of Anthracite coal at 1·5, the weight of good coal in ground per foot thickness of bed per acre would be

Weight of solid coal per foot thick per acre		1,828 tons.
Deduct 18·7% for refuse	342 tons.	
Deduct about 4·7% for faults, troubles, &c.	86 tons.	
	428	428 tons.
Good coal in ground per foot thickness of bed per acre		1,400 tons.

The long ton of 2,240 lbs. is used throughout this estimate.

Column No. 7. The items in this column were found in manner similar to No. 5, by measuring the area worked in each bed as shown upon the published Mine Sheets of the State Survey. In doing this the areas were measured full to make approximate allowance for the areas mined over since the date of publication of the maps.

Column No. 8 is found by multiplying items of column 7 by those of column 4.

Column 9. The total approximate production of this coal basin to Jan. 1, 1892, as found from Mine Inspectors Reports and other published statistics is about 383,244,421 tons, and this amount divided by the grand total footings of Column 8 would give 826 tons as the average quantity of coal produced per foot thickness of bed per acre, to Jan. 1, 1892. The items of Column 8 multiplied by the factor 826 will give the items of Column 9.

While the factor 826 tons may fairly represent the average yield for the whole basin in the past, it will not necessarily be correct for the special areas, particularly in the future when more mining is done in deeper parts of the basin.

The conditions under which coal is mined have a direct effect upon the yield per acre, where the conditions are favorable (North of Scranton for instance), light covering over the coal, few surface improvements, little trouble from gas, etc., etc., more tons per acre can be won than in the Wilkes-Barre region where the beds are deep and gassy, surface either much improved or covered by deep gravel deposits filled with water, that will flood the mine if the roof is cracked, thus requiring stronger pillars, better ventilation and more careful mining in every way.

Column 10 is intended to show the approximate quantity of clean coal wasted in mining and preparing the coal for market. (The slate, bone, and other refuse being fully accounted for above under head of Column 6.)

In 1890 and '91 The Clear Spring Coal Company produced 342,523 tons of coal; and 66,532 tons of culm (including all the buckwheat coal) went to the culm pile, *i. e.*, the culm was about 19·7% of the total production, this seems to agree fairly well with the experiments made by the Lehigh and Wilkes-Barre Coal Company as published in Report A, of the Geological Survey of Pennsylvania, page 56, where the average percentage of waste for old style rolls is shown to be 15·7% of quantity charged into the breaker or 19·8% of the coal shipped. And on page 123 another experiment shows the culm to be 21·4% of shipments. The average of these percentages shows the culm to be 20·3 % of the production.

Of course in cases where the buckwheat and birdseye are taken out the percentage is much reduced; this is now being done to a large extent: quite a saving is also made by using the more improved machinery. On the other hand all of the pea coal and much of the chestnut formerly went to the culm pile, so that the factor 20 per cent. of the production, or 165·2 tons per foot per acre as used in this column cannot be considered as excessive for the waste in the past.

Column 11. By deducting the sum of factors used in Columns 9 and 10 from the factor 1400 we have 408·8 as the percentage of coal per foot per acre now remaining in the ground in the areas that have been mined over, it exists in the form of solid pillars, and coal wasted with the "gob" or mine refuse. While part of this area has been worked out there are still considerable areas where much coal can yet be won by robbing these pillars, but no account has been taken of this item in the table.

By deducting the items of Column 7 from those of Column 5 we obtain the items of Column 12, and using these as a basis we obtain the items of Columns 13 and 14 from it, in same way as Columns 6 and 9 were obtained by using Column 5.

In Column 14 in view of the facts referred to under Column 9, as to the effect of the conditions under which the coal is mined upon the yield per acre, we have thought best to use a larger factor, *i. e.*, 900 tons for the yield per acre for areas North of Scranton where the conditions are more favorable for mining in the future.

For the Scranton and Pittston districts 800 tons per acre is used, and for the lower end of the basin 700 tons, as this is about all that can be obtained under the present conditions, methods of mining, etc.

From the footings of Columns 13 and 14 we see that the result of the estimate is that something over half the solid coal remaining in the ground can be mined.

Column 15 shows the production of the several districts for each year for the past five years, together with the percentage of the total output that each has produced.

Column 16 shows approximately the probable life of each district at present rate of production, also the percentage of total quantity of coal in the field that each district possesses.

The greatest portion of the mining in the past has been at those points where the coal was thickest, best and most accessible, where the mining could be done at the greatest profit to the operator, and those parts where the beds were thinner have been left for the future, and hence the items in Column 4 which represent the average thickness of beds for the whole district, may be less than the average thickness of same beds for area worked in any particular district, while at the same time they may be more than average of the unworked areas. In this case the quantity of coal we have credited to the unworked areas would overrun because the beds would not be as thick as estimated. In view of this therefore the estimate may be somewhat excessive. On the other hand future developments may prove more and better coal than has been anticipated in portions of these unworked areas.

In addition to this, the experience and methods of mining that have prevailed in the past (and upon which our estimate is based), which have been to say the least very wasteful, may be very much improved in the future, so that larger yields per acre will eventually be obtained from the unmined areas, and the worked and abandoned parts of the region may be partially remined and thus increase the quantity of available coal above our estimate.

WM. GRIFFITH.

Scranton, Pa., April 20, 1892.