Coal—Pennsylvania Anthracite

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GENERAL SUMMARY

PRODUCTION of Pennsylvania anthracite continued to decline in 1960 as the year's output, 18.8 million net tons, fell 9 percent below 1959. Since the combined production at surface operations—strip pits, culm banks, and dredges—remained relatively unchanged, virtually all the decline occurred at underground operations because of the closing of many deep mines due to high costs, excessive mine water, and other factors.

At the mine, the 1960 production was valued at $147.1 million, down 15 percent. The proportionately greater decline in mine value than in production was attributable largely, as in 1959, to a greater decrease in shipments of the higher priced sizes. Shipments of Pea and larger sizes were 13 percent below 1959 and represented only 40 percent of the year's total, compared with 42 percent in 1959 and 45 percent in 1958. Although Buckwheat No. 1 and the smaller sizes were in relatively greater market demand than the larger coals, only Buckwheat No. 5 showed an increase over 1959. Except for Buckwheat No. 4, which remained about the same, the smaller sizes also declined in average value. As a result of these developments, the average mine value dropped from $8.35 to $7.82 per net ton, the lowest since 1947.

Apparent consumption of Pennsylvania anthracite (production,

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plus imports, minus exports, and plus or minus changes in producers' stocks) totaled 17.6 million tons in 1960, a drop of only 6 percent. The disparity between the declines in production and apparent consumption resulted largely from a 54-percent reduction in producers' stocks. However, neither statistic adequately reflected actual consumption, as retail dealers outside the producing region and public utilities together reduced inventories slightly more than one-half million tons. The Anthracite Institute reported that the weather in major anthracite markets was colder than both 1959 and normal. However, since December was the coldest in many years, domestic consumers undoubtedly entered 1961 with extremely low stocks—a factor not covered by the 1960 data.

The proportions contributed by each source of production changed materially because of the sharp fall in deep-mine production. Output from strip pits increased from 34 percent in 1959 to 38 percent in 1960; dredge production moved from 3 to 4 percent; culm and silt banks contributed 17 percent of the annual production in both years. Underground coal accounted for only 41 percent of the 1960 output, compared with 46 percent in 1959 and 51 percent in 1958.

The export trade slumped to its lowest level since 1934, as only 1.4 million tons was shipped to points outside the United States. Although exports to overseas destinations fell 29 percent, the 18-percent decline in shipments to Canada accounted for the bulk of the tonnage loss.

The average number of men working daily at anthracite operations fell 18 percent to a total of 19,051 in 1960. The decline was twice as severe as the decrease in production, owing to the continued closing of less efficient operations with relatively high manpower requirements. Anthracite operations were active an average of 176 days, or 3 more than in 1959. However, owing to the reduced number of men working, actual worktime declined in 1960 to a total of 3.4 million man-days, or 17 percent below 1959. The productivity rate advanced to a new record of 5.60 tons per man-day, a 9-percent gain over the former high set in 1959. The increased productivity may be ascribed to the lessened activity at underground mines, which have relatively low rates of output per man-day. The average hourly earnings of anthracite workers in 1960, according to the U.S. Department of Labor, remained at $2.75, the same as in 1959.

Injury experience of the anthracite industry was improved somewhat in 1960. The number of fatal injuries was 35, or 12 less than 1959, and nonfatal injuries declined to 1,401, or 322 below 1959. However, owing to the reduced worktime, the frequency rates of 1.43 fatalities and 57.30 nonfatal injuries per million man-hours were only slightly lower than the corresponding rates of 1.60 and 58.66 in 1959.

This indicated improvement can be attributed to the relatively greater activity at the less hazardous strip mines, culm banks, and dredges.

Summarized salient annual statistics for 1956–60 are presented in table 1, and monthly developments in the Pennsylvania anthracite industry during 1960 are indicated in table 2. Table 3 shows selected historical data for the entire period, 1890–1960.

TABLE 1.—Salient statistics of the Pennsylvania anthracite industry, 1956–60

	1956	1957	1958	1959	1960
Production:					
Loaded at mines for shipment outside producing region:					
Breakers and washeries net tons	23,581,689	20,355,414	15,497,828	15,047,444	13,089,007
Dredges do	688,379	630,237	631,717	716,169	675,892
Sold by local trade and used by employees net tons	4,288,532	4,073,406	[1] 4,846,646	4,757,088	4,950,544
Used at collieries for power and heat net tons	341,620	279,264	194,951	128,585	101,998
Total production do	28,900,220	25,338,321	21,171,142	20,649,286	18,817,441
Value at breaker, washery or dredge	$236,785,062	$227,753,802	$187,898,316	$172,319,913	$147,116,250
Average sales realization per net ton on breaker and washery shipments to points outside producing region:					
Pea and larger	$11.50	$12.50	$11.76	$10.93	$10.23
Buckwheat No. 1 and smaller	$5.31	$6.38	$6.94	$6.88	$6.48
Total all sizes	$8.33	$9.11	$9.31	$8.77	$8.15
Percentage of total breaker and washery shipments to points outside producing region:					
Pea and larger	48.8	44.6	49.1	46.6	44.6
Buckwheat No. 1 and smaller	51.2	55.4	50.9	53.4	55.4
Producer's stocks at end of year [2] net tons	341,505	499,620	406,375	429,020	199,356
Exports [3] do	5,244,349	4,331,785	2,279,859	1,787,558	1,430,156
Imports [3] do	46	1,138	4,363	2,633	1,476
Consumption (apparent) do	24,000,000	20,800,000	19,000,000	18,800,000	17,600,000
Average number of days worked	216	196	183	173	176
Average number of men working daily	31,516	30,825	26,540	23,294	19,051
Output per man per day net tons	4.25	4.18	4.36	5.12	5.60
Output per man per year do	918	819	798	886	984
Quantity cut by machines do	400,402	292,307	184,028	260,502	225,520
Quantity mined by stripping do	8,354,230	7,543,157	6,877,761	7,096,343	7,112,288
Quantity loaded by machines underground net tons	7,308,110	6,657,479	5,332,043	4,700,542	4,044,392
Distribution:					
Total receipts in New England [4] net tons	1,619,605	1,264,726	1,012,035	869,166	697,353
Exports to Canada [3] do	2,356,351	1,778,551	1,522,408	1,453,228	1,194,170
Loaded into vessels at Lake Erie [5] net tons	588,085	454,121	260,050	329,204	244,468
Receipts at Duluth-Superior [6] net tons	311,599	260,931	93,499	71,846	60,441

[1] An undetermined part included in local sales in 1958 was reported as shipped outside region in 1957.
[2] Anthracite Committee.
[3] U.S. Department of Commerce.
[4] Commonwealth of Massachusetts, Division on the Necessaries of Life, and Association of American Railroads.
[5] Ore and Coal Exchange, Cleveland, Ohio.
[6] U.S. Engineer Office, Duluth, Minnesota.

TABLE 2.—Statistical summary of monthly developments

(All tonnage figures

	January	February	March	April	May
Production (including mine fuel, local sales, and dredge coal)	1,701,000	1,643,000	1,749,000	1,281,000	1,313,000
Shipments (breakers and washeries only, all sizes):					
By rail [1]	851,689	723,612	873,372	654,552	697,157
By truck [2]	941,954	875,899	976,005	565,706	534,067
Carloadings [4]	16,928	15,434	17,942	14,655	15,674
Distribution:					
Lake Erie loadings [5]				26,067	29,034
Lake Ontario loadings [6]					
Receipts at Duluth-Superior [7]					5,000
Upper Lake dock trade: [8]					
Receipts:					
Lake Superior					
Lake Michigan	933	812	1,146	19,940	2,772
Deliveries (reloadings):					
Lake Superior	5,966	5,317	2,604	4,049	5,552
Lake Michigan	4,726	4,309	4,363	2,643	2,513
New England receipts:					
Tidewater [4]					
Rail [9]	61,198	46,308	49,835	25,966	48,827
Exports [10]	100,577	104,595	90,204	110,117	59,625
Imports [10]	745	133		137	268
Industrial consumption and stocks:					
Railroad (Class 1 only): [11]					
Consumption	34,038	31,523	36,456	21,462	14,319
Stocks	34,797	27,811	21,958	17,505	14,025
Electric utilities: [12]					
Consumption	222,769	210,662	243,348	216,610	232,622
Stocks	1,976,827	1,937,671	1,891,132	1,887,942	1,879,370
Used for cokemaking:					
Consumption	35,773	37,735	42,213	36,043	32,902
Stocks	77,724	65,831	50,517	55,222	67,100
Stocks on Upper Lake docks: [8]					
Lake Superior	43,905	43,123	40,495	36,415	30,863
Lake Michigan	20,787	17,290	14,073	31,298	31,604
Producers' stocks [14]	378,361	365,527	293,525	283,381	333,447
Stocks in retail dealer yards [15]	884,000	722,000	569,000	618,000	714,000
Retail dealer deliveries [16]	797,000	739,000	853,000	318,000	276,000
Wholesale price indexes (1947-49=100) F.o.b. mines: [17]					
Chestnut	128.6	128.6	128.6	117.9	115.8
Pea	129.7	129.7	129.7	120.3	118.4
Buckwheat No. 1	163.8	163.8	163.8	156.0	154.4
Buckwheat No. 3	196.1	196.1	196.1	193.6	192.7
Employee wages and hours: [18]					
Average weekly earnings	$88.09	$76.16	$99.91	$80.88	$82.29
Average hourly earnings	$2.77	$2.80	$2.76	$2.77	$2.78
Average number hours worked per week	31.8	27.2	36.2	29.2	29.6

[1] Furnished by Anthracite Institute.
[2] Pennsylvania Department of Mines and Mineral Industries.
[3] Less than 0.05 percent.
[4] Association of American Railroads.
[5] Ore and Coal Exchange, Cleveland, Ohio.
[6] Buffalo Branch, Ore and Coal Exchange, Cleveland, Ohio.
[7] U.S. Engineer Office, Duluth, Minn.
[8] Includes all commercial docks on Lake Superior and west shore of Lake Michigan as far south as Kenosha Data supplied by Upper Lake Docks Coal Bureau, Inc., and direct reports to the Bureau of Mines.
[9] Furnished by Commonwealth of Massachusetts, Division on the Necessaries of Life.

in the Pennsylvania anthracite industry in 1960

represent net tons)

June	July	August	September	October	November	December	Year 1960	Change from 1959 (percent)	Year 1959
1,496,000	1,186,000	1,704,000	1,580,000	1,678,000	1,692,000	1,794,000	18,817,000	−8.9	20,649,000
915,511	597,888	932,916	809,752	947,860	861,668	874,111	9,740,088	−14.8	11,426,678
599,800	455.249	656,989	618,780	735,882	736,421	971,664	8,668,416	(3)	8,672,373
18,889	13.551	19,963	17,274	19,488	18,977	17,090	205,865	−13.5	237,891
4,947	21,030	53,940	44,229	48,500	16,721	----------	244,468	−25.7	329,204
8,596	4,952	2,509	4,889	26,406	1,108	----------	48,460	+102.6	23,918
4,946	----------	12,908	25,085	2,489	10,013	----------	60,441	−15.9	71,845
----------	59	12,908	25,138	12,534	10,014	----------	60,653	−15.7	71,941
3,587	1,377	6,347	1,392	1,227	1,936	1,517	42,986	−1.7	43,719
2,793	2,494	4,921	6,277	11,536	7,832	4,588	63,929	−22.7	82,665
3,987	4,106	2,687	3,709	4,187	2,759	3,858	43,847	−22.5	56,577
----------	----------	----------	----------	----------	----------	----------	----------	----------	1,773
77,000	45,457	69,003	65,802	77,561	77,125	53,271	697,353	−19.6	867,393
153,800	84,805	137,083	149,176	154,336	175,828	110,010	1,430,156	−20.0	1,787,558
----------	----------	----------	----------	49	92	52	1,476	−43.9	2,633
11,865	10,503	9,660	10,914	16,808	19.059	31,707	248,314	−14.8	291,501
21,007	27,961	27,898	28,183	29,570	25,842	29,856	29,856	−6.4	31,899
219,423	236,874	230,913	235,908	239,383	224,662	238,282	2,751,456	+4.7	[13] 2,629,051
1,898,648	1,857,880	1,881,332	1,879,123	1,864,994	1,888,534	1,798,787	1,798,787	−10.9	2,017,993
29,645	25,942	26,204	25,540	28,469	25,724	24,072	370,262	+.4	368,830
71,499	68,800	86,143	89,366	108,090	107,542	92,848	92,848	−14.7	108,893
28,070	25,631	33,618	51,983	52,981	55,113	50,490	50,490	+1.2	49,872
31,204	28,475	32,135	29,818	26,858	26,035	23,694	23,694	−3.6	24,580
316,867	290,288	336,150	339,299	318,977	327,120	199,356	199,356	−53.5	429,020
830,000	862,000	908,000	901,000	860,000	893,000	729,000	729,000	−29.5	1,034,000
433,000	488,000	583,000	534,000	565,000	452,000	737,000	6,775,000	−10.4	7,562,000
115.8	119.5	119.5	123.8	123.8	123.8	123.8	122.5	−1.5	124.4
118.4	120.6	120.6	123.1	123.1	123.1	123.1	123.3	−1.5	125.2
154.4	157.6	157.6	160.8	160.8	160.8	160.8	159.6	−1.4	161.9
192.7	196.1	196.1	196.1	196.1	196.1	196.1	195.3	+1.2	193.0
$93.23	$93.50	$94.26	$84.39	$95.22	$94.46	$95.35	$88.83	+4.5	$84.98
$2.75	$2.75	$2.74	$2.74	$2.76	$2.73	$2.74	$2.75	----------	[19] $2.75
33.9	34.0	34.4	30.8	34.5	34.6	34.8	32.3	+4.9	[19] 30.8

[10] U.S. Department of Commerce.
[11] Association of American Railroads. This series discontinued with December 1960.
[12] Federal Power Commission.
[13] Revised.
[14] Anthracite Committee. Represents coal in ground storage on nearest available date to end of month.
[15] Estimated from reports submitted by a selected list of retail dealers.
[16] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.
[17] Bureau of Labor Statistics. Based on data obtained from authorized trade publications.
[18] Bureau of Labor Statistics.
[19] 11-month average.

TABLE 3.—Statistical trends in the Pennsylvania anthracite industry

	Production (net tons)	Value of production	Average value per net ton	Exports [1] (net tons)	Imports [1] (net tons)	Apparent consumption [2] (net tons)	Average number of employees	Average number of days worked	Average tons per man per day	Average tons per man per year	Quantity cut by machines [3] (net tons)	Quantity produced by stripping [4] (net tons)	Quantity loaded mechanically underground [5] (net tons)
1890	46,468,641	$66,383,772	$1.43	889,655	16,962	45,596,000	126,000	200	1.85	369			
1891	50,665,431	73,944,735	1.46	964,601	42,120	49,743,000	126,350	203	1.98	401			
1892	52,472,504	82,442,000	1.57	953,836	72,865	51,592,000	129,050	198	2.06	407			
1893	53,967,543	85,687,078	1.59	1,493,281	60,220	52,534,000	132,944	197	2.06	406			
1894	51,921,121	78,488,063	1.51	1,613,500	100,876	50,408,000	131,603	190	2.08	395			
1895	57,999,337	82,019,272	1.41	1,647,195	158,297	56,510,000	142,917	196	2.07	406			
1896	54,346,081	81,748,651	1.50	1,512,000	113,892	52,948,000	148,991	174	2.10	365			
1897	52,611,681	79,301,954	1.51	1,454,620	27,478	51,185,000	149,884	150	2.34	351			
1898	53,382,645	75,414,537	1.41	1,513,062	3,527	51,873,000	145,504	152	2.41	367			
1899	60,418,005	88,142,130	1.46	1,912,732	68	58,505,000	139,608	173	2.50	433			
1900	57,367,915	85,757,851	1.49	1,853,163	132	55,515,000	144,206	166	2.40	398			
1901	67,471,667	112,504,020	1.67	2,232,504	320	65,239,000	145,309	196	2.37	464			
1902	41,373,595	76,173,586	1.84	1,016,934	190,636	40,547,000	148,141	116	2.40	279			
1903	74,607,068	152,036,448	2.04	2,249,920	196,837	72,554,000	150,483	206	2.41	496			
1904	73,156,709	138,974,020	1.90	2,495,799	81,232	70,742,000	155,861	200	2.35	469			
1905	77,659,850	141,879,000	1.83	2,497,581	38,350	75,201,000	165,406	215	2.18	470			
1906	71,282,411	131,917,694	1.85	2,483,005	36,236	68,836,000	162,355	195	2.25	439			
1907	85,604,312	163,584,056	1.91	3,021,841	11,085	82,594,000	167,234	220	2.33	512			
1908	83,268,754	158,178,849	1.90	3,082,641	18,462	80,205,000	174,174	200	2.39	478			
1909	81,070,359	149,181,587	1.84	3,183,840	3,574	77,890,000	[6] 171,195	205	[7] 2.31	[7] 474			
1910	84,485,236	160,275,302	1.90	3,384,222	9,180	81,110,000	169,497	229	2.17	498			
1911	90,464,067	175,189,392	1.94	3,980,479	2,759	86,486,000	172,585	246	2.13	524	69,907		
1912	84,361,598	177,622,626	2.11	4,131,444	1,870	80,232,000	174,030	231	2.10	485	246,216		
1913	91,524,922	195,181,127	2.13	4,652,912	1,004	85,474,000	175,745	257	2.02	520	555,776		
1914	90,821,507	188,181,399	2.07	4,289,873	17,696	84,041,000	179,679	245	2.06	505	916,596		
1915	88,995,061	184,653,498	2.07	3,965,255	814	88,144,000	176,552	230	2.19	504	1,307,756	1,121,603	
1916	87,578,493	202,009,561	2.31	4,665,530	6,000	87,118,000	159,869	253	2.16	548	1,839,506	1,987,800	
1917	99,611,811	283,650,723	2.85	6,007,306	13,000	94,068,000	154,174	285	2.27	646	1,955,223	2,301,588	
1918	98,826,084	336,480,347	3.40	4,967,808	37,272	92,775,000	147,121	293	2.29	672	1,857,514	2,360,183	
1919	88,092,201	364,926,950	4.14	4,976,598	82,818	81,518,000	154,571	266	2.14	570	1,575,205	2,006,879	
1920	89,598,249	434,252,198	4.85	5,403,749	31,748	85,786,000	145,074	271	2.28	618	938,073	2,054,441	
1921	90,473,451	452,304,903	5.00	4,677,368	8,894	81,950,000	159,499	271	2.09	567	979,145	2,027,790	
1922	54,683,022	273,700,125	5.01	2,649,457	233,528	56,799,000	156,849	151	2.31	349	502,793	949,745	
1923	93,339,009	506,786,768	5.43	5,090,138	300,360	86,914,000	157,743	268	2.21	592	1,208,542	2,263,098	
1924	87,926,862	477,230,852	5.43	4,017,785	117,951	80,717,000	160,009	274	2.00	550	1,423,884	1,865,677	
1925	61,817,149	327,664,512	5.30	3,179,006	382,894	64,061,000	160,312	182	2.12	386	941,189	1,578,478	
1926	84,437,452	474,164,252	5.62	4,029,683	813,956	77,221,000	165,386	244	2.09	511	931,650	2,401,356	
1927	80,095,564	420,941,726	5.26	3,325,507	119,030	74,672,000	165,259	225	2.15	485	1,171,888	2,153,156	[6] 2,223,281
1928	75,348,069	393,637,690	5.22	3,336,272	384,707	73,650,000	160,681	217	2.17	469	1,289,809	2,422,924	[6] 2,351,074
1929	73,828,195	385,642,751	5.22	3,406,369	487,172	71,457,000	151,501	225	2.16	487	1,159,910	1,911,766	3,470,158
1930	69,384,837	354,574,191	5.11	2,551,659	674,812	67,628,000	150,804	208	2.21	460	1,410,123	2,536,288	4,467,750

1931	59,645,652	296,354,586	4.97	1,778,308	637,951	58,408,000	139,431	181	2.37	428	1,587,265	3,813,237	4,384,780
1932	49,855,221	222,375,129	4.46	1,303,355	607,097	50,500,000	121,243	162	2.54	411	1,674,223	3,980,973	5,433,340
1933	49,541,344	206,718,405	4.17	1,0o4,562	456,252	49,600,000	104,633	182	2.60	473	1,648,249	4,932,069	6,557,267
1934	57,168,291	244,152,245	4.27	1,297,610	478,118	55,500,000	109,050	207	2.53	524	1,981,088	5,798,138	9,284,486
1935	52,158,783	210,130,565	4.03	1,608,549	571,439	51,100,000	103,269	189	2.68	505	1,848,095	5,187,072	9,279,057
1936	54,579,535	227,003,538	4.16	1,678,024	614,639	53,200,000	102,081	192	2.79	535	2,162,744	6,203,267	10,827,946
1937	51,856,433	197,598,849	3.81	1,914,173	395,737	50,400,000	99,085	189	2.77	523	1,984,512	5,696,018	10,683,837
1938	46,099,027	180,600,167	3.92	1,908,911	362,895	45,200,000	96,417	171	2.79	478	1,588,407	5,095,341	10,151,669
1939	51,487,377	187,175,324	3.64	2,590,000	298,153	49,700,000	93,138	183	3.02	553	1,881,884	5,486,479	11,773,833
1940	51,484,640	205,489,814	3.99	2,667,632	135,436	49,000,000	91,313	186	3.02	562	1,816,483	6,352,700	12,326,000
1941	[8] 56,368,267	240,275,126	4.26	3,380,189	74,669	52,700,000	88,054	203	[9] 3.04	617	1,855,422	7,316,574	13,441,987
1942	[8] 60,327,729	271,673,380	4.50	4,438,588	140,115	56,500,000	82,121	239	[9] 2.95	705	2,285,640	9,070,933	14,741,459
1943	[8] 60,643,620	306,816,018	5.06	4,138,680	166,020	57,100,000	79,153	270	[9] 2.78	751	1,624,883	8,989,387	14,745,793
1944	[8] 63,701,363	354,582,884	5.57	4,185,933	11,847	59,400,000	77,591	292	[9] 2.79	815	1,336,082	10,953,030	14,975,146
1945	[8] 54,933,909	323,944,435	5.90	3,691,247	149	51,600,000	72,842	269	[9] 2.79	751	1,210,171	10,056,325	13,927,955
1946	[8] 60,506,873	413,417,070	6.83	6,497,245	9,556	53,900,000	78,145	271	[9] 2.84	770	1,232,828	12,858,930	15,619,162
1947	[8] 57,190,009	413,019,486	7.22	8,509,995	10,350	48,200,000	78,600	259	[9] 2.78	720	1,209,983	12,603,545	16,054,011
1948	[8] 57,139,948	467,051,800	8.17	6,675,914	945	50,200,000	76,215	265	[9] 2.81	745	1,016,757	13,352,874	15,742,368
1949	[8] 42,701,724	358,008,451	8.38	4,942,670	----------	37,700,000	75,377	195	[9] 2.87	560	557,599	10,376,808	11,858,088
1950	[8] 44,076,703	392,398,006	8.90	3,891,569	18,289	39,900,000	72,624	211	[9] 2.83	597	611,734	11,833,934	12,335,650
1951 [10]	42,669,997	405,817,963	9.51	5,955,535	26,812	37,000,000	68,995	208	2.97	618	496,085	11,135,990	10,847,787
1952	40,582,558	379,714,076	9.36	4,592,060	29,370	35,300,000	65,923	201	3.06	615	386,128	10,696,705	10,034,464
1953	30,949,152	299,139,687	9.67	2,724,270	31,443	28,000,000	57,862	163	3.28	535	318,699	8,606,482	6,838,769
1954	29,083,477	247,870,023	8.52	2,851,239	5,831	26,900,000	43,990	164	4.02	659	381,424	7,939,680	6,978,035
1955	26,204,554	206,096,662	7.86	3,152,313	170	23,600,000	[11] 33,523	[11] 197	[11] 3.96	[11] 780	393,932	7,703,907	6,660,939
1956	28,900,220	236,785,062	8.19	5,244,349	46	24,000,000	31,516	216	4.25	918	400,402	8,354,230	7,308,110
1957	25,338,321	227,753,802	8.99	4,331,785	1,138	20,800,000	30,825	196	4.18	819	292,307	7,543,157	6,657,479
1958	21,171,142	187,898,316	8.88	2,279,859	4,363	19,000,000	26,540	183	4.36	798	184,028	6,877,761	5,332,043
1959	20,649,286	172,319,913	8.35	1,787,558	2,633	18,800,000	23,294	173	5.12	886	260,502	7,096,343	4,700,542
1960	18,817,441	147,116,250	7.82	1,430,156	1,476	17,600,000	19,051	176	5.60	986	225,520	7,112,288	4,044,392

[1] U.S. Department of Commerce.
[2] Before 1913 the figures of consumption take no account of producers' stocks, there being no data available for this item.
[3] Data first collected in 1911.
[4] Data first collected in 1915.
[5] Data first collected in 1929.
[6] As reported by the Commonwealth of Pennsylvania, Department of Mines.
[7] Calculated on basis of Pennsylvania Department of Mines employment data.
[8] Includes some "bootleg" coal purchased by authorized operators and prepared at their breakers.
[9] Output per man calculated on authorized tonnages only; bootleg purchases excluded.
[10] Figures for 1951 and subsequent years are not strictly comparable with previous years. See Production and Employment sections, Coal—Pennsylvania Anthracite, Minerals Yearbook, 1951.
[11] Estimated.

SCOPE OF REPORT

Data in this chapter refer only to the anthracite or hard coal found in 10 counties of northeastern Pennsylvania. Geologically, the anthracite area is divided into four producing fields: The Northern, Eastern Middle, Western Middle, and the Southern. The area is also divided by the coal trade into three regions: The Wyoming, Lehigh, and Schuylkill. Because the tonnage involved is small, the semianthracite produced in Sullivan County is included in the Northern field or Wyoming region. Information on the anthracite coals of Arkansas, Colorado, New Mexico, Virginia, and Washington is included in the Bituminous Coal and Lignite chapter of the Minerals Yearbook.

As only a small percentage of the Pennsylvania anthracite is consumed without preparation, the Bureau's production statistics represent largely the cleaned and sized output of preparation plants and dredges, expressed in terms of the short or net ton, of 2,000 pounds. Hence, the principal report forms used by the Bureau are those mailed to preparation plants and dredge operators. However, questionnaires are sent to operators of underground mines, strip pits, and culm or silt banks to obtain data on run-of-mine production. These operators also supply names of preparation plants to which raw coal is shipped for preparation, number and type of machines used, and other data. From the information filed by these producers of raw coal, the Bureau assigns tonnages of clean coal to the county, field, and region of origin. Also, by checking these reports with those submitted by preparation plants, it is possible to eliminate duplicate reporting and insure maximum coverage. The small percentage of the output (less than 2 percent) on which no reports are received is estimated by the Bureau on the basis of data released by the Pennsylvania Department of Mines and Mineral Industries and the Anthracite Committee.

Data on employment in the Pennsylvania anthracite mining industry were collected as part of the canvass on production for 1954 and prior years. Beginning with 1956, however, employment data have been compiled from the Bureau of Mines questionnaire, Mine Injuries and Employment—Pennsylvania Anthracite, to reduce the reporting burden of respondents. The Bureau employment data include production, development, maintenance, repair, supervisory and technical personnel, and owners or firm members who actually produce coal. Sales and office personnel and other employees not engaged in producing anthracite are excluded.

Anthracite distribution data are collected by the Bureau from producers, wholesalers, sales agents, and dock operators on the basis of the coal year (April 1–March 31). All shipments are included, whether made from current production or from producers' stocks. The distribution reports, published in the Mineral Market Report series, show shipments by sizes and method of movement to more than 300 cities in the United States and Canada, and may be obtained by writing to the U.S. Bureau of Mines, Washington 25, D.C.

ACKNOWLEDGMENTS

As the Bureau's direct-mail canvasses of the Pennsylvania anthracite mining industry are limited to the collection of data on production, distribution, employment, f.o.b. mine values, equipment, injuries, and retail-dealer stocks and deliveries, the preparation of this chapter required the use of other data obtained from a wide variety of sources. Although care has been taken to acknowledge each of these sources by textual or footnote references, the Bureau is particularly grateful for the continued cooperation of the Pennsylvania Department of Mines and Mineral Industries, the Anthracite Committee, the Anthracite Institute, the Association of American Railroads, the Ore and Coal Exchange, Commonwealth of Massachusetts, and the Upper Lake Docks Coal Bureau, Inc. Sincere thanks are due also to the many anthracite producers who annually submit voluntary reports to the Bureau. It would have been impossible to prepare this chapter without their excellent cooperation.

The basic production and employment data for 1960 were collected and tabulated by Ruth A. Cooper and Kathryn S. Huling of the Anthracite Research Center, Schuylkill Haven, Pa., C. S. Kuebler, Research Director.

PRODUCTION, MINING METHODS AND EQUIPMENT

Output of Pennsylvania anthracite from all sources totaled 18.8 million tons in 1960, a decline of 9 percent from 1959. As the result of continued efforts by the industry to reduce costs by concentrating production at the most efficient operations, many underground operations were curtailed or closed during the year. Consequently, the percentage produced underground fell to only 41 percent of the year's total, compared with 46 percent in 1959 and 51 percent in 1958. On the other hand, strip tonnage moved upward, from 34 percent of annual production in 1959 to 38 percent in 1960, and the proportion recovered from old culm and silt banks remained the same, 17 percent. Dredge production equalled 4 percent of the 1960 total, up 1 point from 1959.

Demand for the individual sizes of anthracite varied widely in 1960. Shipments of Pea and larger (generally referred to as hand-fired sizes) showed the sharpest decline, 13 percent, followed by Buckwheat Nos. 1, 2 (Rice), and 3 (Barley) with a combined decrease of 9 percent. The industrial sizes, Buckwheat No. 4 and smaller, were in relatively strong market demand, and shipments were only 2 percent below the 1959 volume. Data on shipments of anthracite, by sizes and percent of total, are shown in tables 4–7. Figure 1 presents data on shipments by regions, 1935–60.

Decreased production was reported in all three regions, but the substantial decline in the Lehigh caused the shares contributed by the Schuylkill and Wyoming regions to increase. Of total output in 1960, 51 percent was produced in the Schuylkill (50 percent in 1959), 34 percent in the Wyoming (33 percent in 1959), and 15 percent in the Lehigh (17 percent in 1959). On a quantitative basis, production dropped 19 percent in the Lehigh region, 6 percent in the Schuylkill, and 8 percent in the Wyoming.

TABLE 4.—Pennsylvania anthracite shipped in 1960, by regions and sizes

Size	From breakers and washeries								
	Lehigh region			Schuylkill region			Wyoming region [1]		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken				5,629	540	6,169	4,600		4,600
Egg	22,838	1,012	23,850	41,455	1,009	42,464	42,331	1,056	43,387
Stove	304,730	11,875	316,605	853,809	212,592	1,066,401	881,014	39,476	920,490
Chestnut	378,654	43,856	422,510	978,046	397,823	1,375,869	1,045,968	196,928	1,242,896
Pea	242,881	63,627	306,508	601,417	310,225	911,642	433,350	442,860	876,210
Total Pea and larger	949,103	120,370	1,069,473	2,480,356	922,189	3,402,545	2,407,263	680,320	3,087,583
Buckwheat No. 1	243,950	53,034	296,984	794,271	295,664	1,089,935	662,640	340,902	1,003,542
Buckwheat No. 2 (Rice)	147,725	88,391	236,116	563,613	288,028	851,641	370,937	203,150	574,087
Buckwheat No. 3 (Barley)	223,194	25,723	248,917	936,168	253,335	1,189,503	581,834	100,490	682,324
Buckwheat No. 4	200,420		200,420	578,017	73,379	651,396	134,880	2,408	137,288
Buckwheat No. 5	237,821	61,795	299,616	819,830	226,579	1,046,409	159,422	49,205	208,627
Other [3]	102,604	297,801	400,405	337,212	422,258	759,470	157,747	409,702	567,449
Total Buckwheat No. 1 and smaller	1,155,714	526,744	1,682,458	4,029,111	1,559,243	5,588,354	2,067,460	1,105,857	3,173,317
Grand total	2,104,817	647,114	2,751,931	6,509,467	2,481,432	8,990,899	4,474,723	1,786,177	6,260,900
VALUE									
Lump [2] and Broken				$59,290	$6,249	$65,539	$51,515		$51,515
Egg	$234,073	$9,887	$243,960	423,853	10,553	434,406	440,373	$11,845	452,218
Stove	3,215,866	135,552	3,351,418	8,822,047	2,261,746	11,083,793	9,412,283	474,172	9,886,455
Chestnut	4,068,480	572,600	4,641,080	10,282,140	4,245,820	14,527,960	11,403,344	2,553,382	13,956,726
Pea	2,144,927	749,646	2,894,573	5,057,479	2,769,208	7,826,687	4,111,117	5,208,650	9,319,767
Total Pea and larger	9,663,346	1,467,685	11,131,031	24,644,809	9,293,576	33,938,385	25,418,632	8,248,049	33,666,681

Buckwheat No. 1	2,032,080	567,106	2,599,186	6,394,523	2,472,804	8,867,327	5,328,408	3,625,133	8,953,541
Buckwheat No. 2 (Rice)	1,234,271	958,762	2,193,033	4,449,701	2,356,495	6,806,196	3,204,030	2,015,416	5,219,446
Buckwheat No. 3 (Barley)	1,592,850	211,692	1,804,542	6,453,616	1,590,550	8,044,166	4,151,196	736,695	4,887,891
Buckwheat No. 4	1,012,318		1,012,318	2,806,233	369,787	3,176,020	699,299	13,121	712,420
Buckwheat No. 5	1,172,452	293,344	1,465,796	3,517,117	908,621	4,425,738	772,991	223,410	996,401
Other [3]	238,969	470,225	709,194	1,239,617	964,223	2,203,840	691,842	747,081	1,438,923
Total Buckwheat No. 1 and smaller	7,282,940	2,501,129	9,784,069	24,860,807	8,662,480	33,523,287	14,847,766	7,360,856	22,208,622
Grand total	16,946,286	3,968,814	20,915,100	49,505,616	17,956,056	67,461,672	40,266,398	15,608,905	55,875,303
AVERAGE VALUE PER TON									
Lump [3] and Broken				$10.53	$11.57	$10.62	$11.20		$11.20
Egg	$10.25	$9.77	$10.23	10.22	10.46	10.23	10.40	$11.22	10.42
Stove	10.55	11.41	10.59	10.33	10.64	10.39	10.68	12.01	10.74
Chestnut	10.74	13.06	10.98	10.51	10.67	10.56	10.90	12.97	11.23
Pea	8.83	11.78	9.44	8.41	8.93	8.59	9.49	11.76	10.64
Total Pea and larger	10.18	12.19	10.41	9.94	10.08	9.97	10.56	12.12	10.90
Buckwheat No. 1	8.33	10.69	8.75	8.05	8.36	8.14	8.04	10.63	8.92
Buckwheat No. 2 (Rice)	8.36	10.85	9.29	7.89	8.18	7.99	8.64	9.92	9.09
Buckwheat No. 3 (Barley)	7.14	8.23	7.25	6.89	6.28	6.76	7.13	7.33	7.16
Buckwheat No. 4	5.05		5.05	4.85	5.04	4.88	5.18	5.45	5.19
Buckwheat No. 5	4.93	4.75	4.89	4.29	4.01	4.23	4.85	4.54	4.78
Other [3]	2.33	1.58	1.77	3.68	2.28	2.90	4.39	1.82	2.54
Total Buckwheat No. 1 and smaller	6.30	4.75	5.82	6.17	5.56	6.00	7.18	6.66	7.00
Grand total	8.05	6.13	7.60	7.61	7.24	7.50	9.00	8.74	8.92

See footnotes at end of table.

TABLE 4.—Pennsylvania anthracite shipped in 1960, by regions and sizes—Continued

Size	Total breakers and washeries			From river dredging			Grand total		
	Outside region	Local sales	Total	Outside region	Local sales	Total	Outside region	Local sales	Total
NET TONS									
Lump [2] and Broken	10,229	540	10,769				10,229	540	10,769
Egg	106,624	3,077	109,701				106,624	3,077	109,701
Stove	2,039,553	263,943	2,303,496				2,039,553	263,943	2,303,496
Chestnut	2,402,668	638,607	3,041,275				2,402,668	638,607	3,041,275
Pea	1,277,648	816,712	2,094,360	200		200	1,277,848	816,712	2,094,560
Total Pea and larger	5,836,722	1,722,879	7,559,601	200		200	5,836,922	1,722,879	7,559,801
Buckwheat No. 1	1,700,861	689,600	2,390,461		185	185	1,700,861	689,785	2,390,646
Buckwheat No. 2 (Rice)	1,082,275	579,569	1,661,844	1,750	1,056	2,806	1,084,025	580,625	1,664,650
Buckwheat No. 3 (Barley)	1,741,196	379,548	2,120,744	9,740	775	10,515	1,750,936	380,323	2,131,259
Buckwheat No. 4	913,317	75,787	989,104	59,520	2,706	62,226	972,837	78,493	1,051,330
Buckwheat No. 5	1,217,073	337,579	1,554,652	42,847	8,764	51,611	1,259,920	346,343	1,606,263
Other [3]	597,563	1,129,761	1,727,324	561,835	22,335	584,170	1,159,398	1,152,096	2,311,494
Total Buckwheat No. 1 and smaller	7,252,285	3,191,844	10,444,129	675,692	35,821	711,513	7,927,977	3,227,665	11,155,642
Grand total	13,089,007	4,914,723	18,003,730	675,892	35,821	711,713	13,764,899	4,950,544	18,715,443
VALUE									
Lump [2] and Broken	$110,805	$6,249	$117,054				$110,805	$6,249	$117,054
Egg	1,098,299	32,285	1,130,584				1,098,299	32,285	1,130,584
Stove	21,450,196	2,871,470	24,321,666				21,450,196	2,871,470	24,321,666
Chestnut	25,753,964	7,371,802	33,125,766				25,753,964	7,371,802	33,125,766
Pea	11,313,523	8,727,504	20,041,027	$1,250		$1,250	11,314,773	8,727,504	20,042,277
Total Pea and larger	59,726,787	19,009,310	78,736,097	1,250		1,250	59,728,037	19,009,310	78,737,347
Buckwheat No. 1	13,755,011	6,665,043	20,420,054		$1,480	1,480	13,755,011	6,666,523	20,421,534
Buckwheat No. 2 (Rice)	8,888,002	5,330,673	14,218,675	10,900	7,224	18,124	8,898,902	5,337,897	14,236,799
Buckwheat No. 3 (Barley)	12,197,662	2,538,937	14,736,599	47,067	5,800	52,867	12,244,729	2,544,737	14,789,466
Buckwheat No. 4	4,517,850	382,908	4,900,758	257,704	11,027	268,731	4,775,554	393,935	5,169,489
Buckwheat No. 5	5,462,560	1,425,375	6,887,935	184,206	30,083	214,289	5,646,766	1,455,458	7,102,224
Other [3]	2,170,428	2,181,529	4,351,957	1,640,926	58,800	1,699,726	3,811,354	2,240,329	6,051,683
Total Buckwheat No. 1 and smaller	46,991,513	18,524,465	65,515,978	2,140,803	114,414	2,255,217	49,132,316	18,638,879	67,771,195
Grand total	106,718,300	37,533,775	144,252,075	2,142,053	114,414	2,256,467	108,860,353	37,648,189	146,508,542

AVERAGE VALUE PER TON									
Lump [2] and Broken	$10.83	$11.57	$10.87				$10.83	$11.57	$10.87
Egg	10.30	10.49	10.31				10.30	10.49	10.31
Stove	10.52	10.88	10.56				10.52	10.88	10.56
Chestnut	10.72	11.54	10.89				10.72	11.54	10.89
Pea	8.85	10.69	9.57	$6.25		$6.25	8.85	10.69	9.57
Total Pea and larger	10.23	11.03	10.42	6.25		6.25	10.23	11.03	10.42
Buckwheat No. 1	8.09	9.67	8.54		$8.00	8.00	8.09	9.66	8.54
Buckwheat No. 2 (Rice)	8.21	9.20	8.56	6.23	6.84	6.46	8.21	9.19	8.55
Buckwheat No. 3 (Barley)	7.01	6.69	6.95	4.83	7.48	5.03	6.99	6.69	6.94
Buckwheat No. 4	4.95	5.05	4.95	4.33	4.08	4.32	4.91	5.02	4.92
Buckwheat No. 5	4.49	4.22	4.43	4.30	3.43	4.15	4.48	4.20	4.42
Other [3]	3.63	1.93	2.52	2.92	2.63	2.91	3.29	1.94	2.62
Total Buckwheat No. 1 and smaller	6.48	5.80	6.27	3.17	3.19	3.17	6.20	5.77	6.08
Grand total	8.15	7.64	8.01	3.17	3.19	3.17	7.91	7.60	7.83

[1] Includes Sullivan County.
[2] Quantity of Lump included is insignificant.
[3] Includes various mixtures of Buckwheat Nos. 2 to 5 and coal of relatively low dollar value.

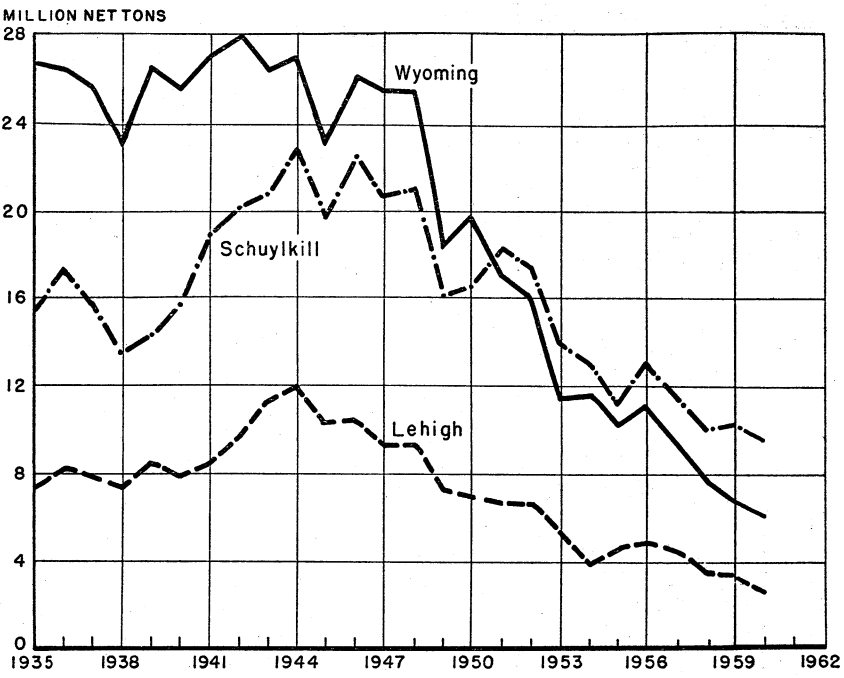

FIGURE 1.—Pennsylvania anthracite shipped from the Lehigh, Schuylkill, and Wyoming regions, 1935–60.

TABLE 5.—Sizes of Pennsylvania anthracite shipped to points outside producing region, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments									
	Lehigh region					Schuylkill region				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	(2)	(2)	(2)	0.1	------	0.1	0.5	0.2	0.2	0.1
Egg	0.9	0.9	1.2	1.1	1.1	1.1	.7	.8	.8	.6
Stove	13.0	10.8	13.9	13.8	14.5	14.0	12.6	15.1	14.0	13.1
Chestnut	15.7	13.6	17.5	17.3	18.0	16.7	15.0	17.5	16.0	15.0
Pea	7.8	8.2	10.5	11.6	11.5	8.6	8.5	9.2	9.8	9.3
Total Pea and larger	37.4	33.5	43.1	43.9	45.1	40.5	37.3	42.8	40.8	38.1
Buckwheat No. 1	9.8	9.4	12.4	12.5	11.6	12.3	11.9	13.3	13.8	12.2
Buckwheat No. 2 (Rice)	6.0	6.1	8.6	7.9	7.0	8.4	8.5	9.3	9.2	8.6
Buckwheat No. 3 (Barley)	8.6	8.7	11.0	10.0	10.6	13.0	14.2	15.1	14.0	14.4
Buckwheat No. 4	9.7	9.0	9.2	9.1	9.5	7.5	7.7	7.4	7.6	8.9
Buckwheat No. 5	10.0	11.3	12.2	11.9	11.3	9.9	10.0	8.8	9.6	12.6
Other	18.5	22.0	3.5	4.7	4.9	8.4	10.4	3.3	5.0	5.2
Total Buckwheat No. 1 and smaller	62.6	66.5	56.9	56.1	54.9	59.5	62.7	57.2	59.2	61.9

Size	Wyoming region [3]					Sullivan County				
Lump [1] and Broken	0.2	0.1	0.1	0.1	0.1	------	------	------	(3)	(3)
Egg	1.6	1.5	1.2	.9	.9	------	------	------		
Stove	25.4	22.0	23.4	21.2	19.7	------	------	6.6		
Chestnut	28.7	27.0	26.0	23.2	23.4	15.7	26.9	7.8		
Pea	8.6	9.7	9.7	10.3	9.7	6.6	27.4	9.5		
Total Pea and larger	64.5	60.3	60.4	55.7	53.8	22.3	54.3	23.9	(3)	(3)
Buckwheat No. 1	12.1	12.6	13.0	13.7	14.8	------	------	6.1	(3)	(3)
Buckwheat No. 2 (Rice)	7.7	7.9	7.9	8.5	8.3	50.7	45.7	5.1		
Buckwheat No. 3 (Barley)	9.2	10.0	10.6	12.4	13.0	27.0	------	4.8		
Buckwheat No. 4	3.0	2.6	2.5	3.3	3.0	------	------	------		
Buckwheat No. 5	.7	1.1	.9	2.5	3.6	------	------	------		
Other	2.8	5.5	4.7	3.9	3.5	------	------	60.1		
Total Buckwheat No. 1 and smaller	35.5	39.7	39.6	44.3	46.2	77.7	45.7	76.1	(3)	(3)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [1] and Broken	0.1	0.3	0.2	(3)	(3)	0.1	0.3	0.2	0.1	0.1
Egg	1.2	1.0	1.0			1.3	1.0	1.0	.9	.8
Stove	18.1	15.5	17.8			18.0	15.5	17.8	16.5	15.6
Chestnut	20.9	18.9	20.5			20.9	18.9	20 5	18.8	18.3
Pea	8.5	8.9	9.6			8.5	8.9	9.6	10.3	9.8
Total Pea and larger	48.8	44.6	49.1	(3)	(3)	48.8	44.6	49.1	46.6	44.6
Buckwheat No. 1	11.7	11.7	13.0	(3)	(3)	11.7	11.7	13.0	13.6	13.0
Buckwheat No. 2 (Rice)	7.7	7.8	8.7			7.7	7.8	8.7	8.7	8.3
Buckwheat No. 3 (Barley)	10.7	11.7	12.8			10.7	11.7	12.8	12.7	13.3
Buckwheat No. 4	6.3	6.1	6.0			6.3	6.1	6.0	6.3	7.0
Buckwheat No. 5	6.5	7.1	6.6			6.5	7.1	6.6	7.5	9.3
Other	8.3	11.0	3.8			8.3	11.0	3.8	4.6	4.5
Total Buckwheat No. 1 and smaller	51.2	55.4	50.9	(3)	(3)	51.2	55.4	50.9	53.4	55.4

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.
[3] Sullivan County included with Wyoming region in 1959 and 1960

TABLE 6.—Sizes of Pennsylvania anthracite shipped to points inside producing region, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments									
	Lehigh region					Schuylkill region				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump[1] and Broken	------	------	------	0.1	------	0.1	(2)	(2)	(2)	(2)
Egg	0.1	0.4	0.3	.5	0.2	.2	0.1	0.1	0.1	0.1
Stove	1.3	2.5	2.3	2.0	1.8	10.7	10.2	8.5	7.6	8.6
Chestnut	17.2	15.8	9.9	6.7	6.8	22.4	20.1	15.6	14.0	16.0
Pea	30.8	29.2	16.9	10.7	9.8	19.4	17.0	12.2	10.5	12.5
Total Pea and larger	49.4	47.9	29.4	20.0	18.6	52.8	47.4	36.4	32.2	37.2
Buckwheat No. 1	15.2	16.4	10.9	7.7	8.2	15.9	14.9	11.7	10.0	11.9
Buckwheat No. 2 (Rice)	25.0	27.2	17.3	13.9	13.7	13.6	12.9	10.1	8.9	11.6
Buckwheat No. 3 (Barley)	6.3	7.4	5.5	5.2	4.0	11.5	14.5	9.4	9.0	10.2
Buckwheat No. 4	.4	.2	.3	1.1	------	1.8	3.9	3.1	2.9	3.0
Buckwheat No. 5	------	.9	1.7	4.5	9.5	.9	1.8	2.1	13.5	9.1
Other	3.7	------	[3]34.9	47.6	46.0	3.5	4.6	[3]27.2	23.5	17.0
Total Buckwheat No. 1 and smaller	50.6	52.1	[3]70.6	80.0	81.4	47.2	52.6	[3]63.6	67.8	62.8

Size	Wyoming region[4]					Sullivan County				
Lump[1] and Broken	1.9	1.0	------	------	------	------	------	------	(4)	(4)
Egg	.2	.1	0.1	0.1	0.1	------	------	------		
Stove	1.9	2.3	2.5	2.8	2.2	------	------	------		
Chestnut	12.1	12.0	12.0	12.4	11.0	43.2	38.1	14.9		
Pea	31.0	31.1	30.1	30.4	24.8	27.5	25.2	12.7		
Total Pea and larger	47.1	46.5	44.7	45.7	38.1	70.7	63.3	27.6	(4)	(4)
Buckwheat No. 1	18.1	19.3	20.2	21.1	19.1	------	------	14.1	(4)	(4)
Buckwheat No. 2 (Rice)	11.0	11.7	11.9	12.5	11.4	12.6	36.7	------		
Buckwheat No. 3 (Barley)	11.0	9.6	9.5	7.6	5.6	16.7	------	------		
Buckwheat No. 4	------	.3	.2	.2	.1	------	------	------		
Buckwheat No. 5	5.6	5.4	2.5	1.7	2.8	------	------	------		
Other	7.2	7.2	11.0	11.2	22.9	------	------	58.3		
Total Buckwheat No. 1 and smaller	52.9	53.5	55.3	54.3	61.9	29.3	36.7	72.4	(4)	(4)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump[1] and Broken	1.0	0.5	(2)	(4)	(4)	1.0	0.5	(2)	(2)	(2)
Egg	.1	.1	0.1			.2	.2	0.1	0.1	0.1
Stove	5.5	5.8	5.3			5.5	5.8	5.3	5.2	5.4
Chestnut	16.8	15.8	13.4			16.8	15.8	13.4	12.4	13.0
Pea	26.2	24.8	20.2			26.2	24.8	20.2	17.0	16.6
Total Pea and larger	49.6	47.0	39.0	(4)	(4)	49.7	47.1	39.0	34.7	35.1
Buckwheat No. 1	17.0	17.1	15.1	(4)	(4)	17.0	17.1	15.1	13.2	14.0
Buckwheat No. 2 (Rice)	13.1	13.5	11.7			13.1	13.6	11.7	10.8	11.8
Buckwheat No. 3 (Barley)	10.8	11.6	9.0			10.8	11.5	9.0	8.0	7.7
Buckwheat No. 4	.8	1.8	1.5			.8	1.8	1.5	1.8	1.5
Buckwheat No. 5	3.3	3.5	2.3			3.2	3.4	2.2	8.4	6.9
Other	5.4	5.5	[3]21.4			5.4	5.5	[3]21.5	23.1	23.0
Total Buckwheat No. 1 and smaller	50.4	53.0	[3]61.0	(4)	(4)	50.3	52.9	[3]61.0	65.3	64.9

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.
[3] An undetermined part of "Other" sizes included in "Local sales" in 1958 was reported as shipped "Outside region" in 1957.
[4] Sullivan County included with Wyoming region in 1959 and 1960.

TABLE 7.—Sizes of Pennsylvania anthracite shipped to points outside and inside producing region in 1960, by regions, in percent of total

(Excludes dredge coal)

Size	Percent of total shipments					
	Lehigh region			Schuylkill region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken				0.1	(2)	0.1
Egg	1.1	0.2	0.9	0.6	0.1	0.5
Stove	14.5	1.8	11.5	13.1	8.6	11.8
Chestnut	18.0	6.8	15.4	15.0	16.0	15.3
Pea	11.5	9.8	11.1	9.3	12.5	10.1
Total Pea and larger	45.1	18.6	38.9	38.1	37.2	37.8
Buckwheat No. 1	11.6	8.2	10.8	12.2	11.9	12.1
Buckwheat No. 2 (Rice)	7.0	13.7	8.6	8.6	11.6	9.5
Buckwheat No. 3 (Barley)	10.6	4.0	9.0	14.4	10.2	13.2
Buckwheat No. 4	9.5		7.3	8.9	3.0	7.3
Buckwheat No. 5	11.3	9.5	10.9	12.6	9.1	11.6
Other	4.9	46.0	14.5	5.2	17.0	8.5
Total Buckwheat No. 1 and smaller	54.9	81.4	61.1	61.9	62.8	62.2

Size	Wyoming region [3]			Total		
Lump [1] and Broken	0.1		0.1	0.1	(2)	0.1
Egg	0.9	0.1	0.7	0.8	0.1	0.6
Stove	19.7	2.2	14.7	15.6	5.4	12.8
Chestnut	23.4	11.0	19.8	18.3	13.0	16.9
Pea	9.7	24.8	14.0	9.8	16.6	11.6
Total Pea and larger	53.8	38.1	49.3	44.6	35.1	42.0
Buckwheat No. 1	14.8	19.1	16.0	13.0	14.0	13.3
Buckwheat No. 2 (Rice)	8.3	11.4	9.2	8.3	11.8	9.2
Buckwheat No. 3 (Barley)	13.0	5.6	10.9	13.3	7.7	11.8
Buckwheat No. 4	3.0	0.1	2.2	7.0	1.5	5.5
Buckwheat No. 5	3.6	2.8	3.3	9.3	6.9	8.6
Other	3.5	22.9	9.1	4.5	23.0	9.6
Total Buckwheat No. 1 and smaller	46.2	61.9	50.7	55.4	64.9	58.0

[1] Quantity of Lump included is insignificant.
[2] Less than 0.05 percent.
[3] Includes Sullivan County.

Among the major producing counties, output declined 8 percent in Luzerne, 11 percent in Lackawanna, 12 percent in Northumberland, and 13 percent in Schuylkill. Production increased in only two counties in 1960, Carbon and Sullivan Counties. Tables 8 to 12 present data on production by fields, regions, and counties.

TABLE 8.—Pennsylvania anthracite produced by fields, in net tons

	1956	1957	1958	1959	1960
Eastern Middle: Breakers and washeries	2,391,906	2,404,609	1,738,555	1,915,788	2,121,500
Western Middle:					
Breakers and washeries	7,268,150	6,930,428	5,982,747	5,813,868	5,104,897
Dredges	46,348	38,497	68,986	65,683	71,828
Total Western Middle	7,314,498	6,968,925	6,051,733	5,879,551	5,176,725
Southern:					
Breakers and washeries	7,425,427	6,061,879	5,086,583	5,269,930	4,530,628
Dredges	625,310	594,941	610,668	650,936	640,335
Total Southern	8,050,737	6,656,820	5,697,251	5,920,866	5,170,963
Northern:					
Breakers and washeries [1]	11,098,450	9,283,704	7,671,464	6,933,081	6,348,253
Dredges	44,629	24,263	12,139		
Total Northern	11,143,079	9,307,967	7,683,603	6,933,081	6,348,253
Total:					
Breakers and washeries	28,183,933	24,680,620	20,479,349	19,932,667	18,105,278
Dredges	716,287	657,701	691,793	716,619	712,163
Grand total	28,900,220	25,338,321	21,171,142	20,649,286	18,817,441

[1] Includes Sullivan County.

TABLE 9.—Pennsylvania anthracite produced in 1960, classified as fresh-mined, culm-bank, and river coal, by fields, in net tons

Field	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Eastern Middle	92,352	32,480	1,194,353	802,315		2,121,500
Western Middle	212,187	1,535,642	2,284,191	1,072,877	71,828	5,176,725
Southern	468,004	1,642,562	1,905,683	514,379	640,335	5,170,963
Northern [1]	3,271,849	440,902	1,728,061	907,441		6,348,253
Total	4,044,392	3,651,586	7,112,288	3,297,012	712,163	18,817,441

[1] Includes Sullivan County.

TABLE 10.—Pennsylvania anthracite produced in 1960, classified as fresh-mined, culm-bank, and river coal, by regions, in net tons

Region	From mines			From culm banks	From river dredging	Total
	Underground		Strip pits			
	Mechanically loaded	Hand loaded				
Lehigh	101,607	192,256	1,640,256	825,825	22,700	2,782,644
Schuylkill	670,936	3,018,428	3,743,971	1,563,746	689,463	9,686,544
Wyoming [1]	3,271,849	440,902	1,728,061	907,441		6,348,253
Total	4,044,392	3,651,586	7,112,288	3,297,012	712,163	18,817,441

[1] Includes Sullivan County.

TABLE 11.—Pennsylvania anthracite shipped outside producing region, sold locally, and used as colliery fuel in 1960, by regions

Region	Shipments outside region		Local sales		Colliery fuel		Total	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Lehigh:								
Breakers and washeries	2,104,817	$16,946,286	647,114	$3,968,814	8,013	$66,426	2,759,944	$20,981,526
Dredges	22,700	111,500					22,700	111,500
Total Lehigh	2,127,517	17,057,786	647,114	3,968,814	8,013	66,426	2,782,644	21,093,026
Schuylkill:								
Breakers and washeries	6,509,467	49,505,616	2,481,432	17,956,056	6,182	48,367	8,997,081	67,510,039
Dredges	653,192	2,030,553	35,821	114,414	450	900	689,463	2,145,867
Total Schuylkill	7,162,659	51,536,169	2,517,253	18,070,470	6,632	49,267	9,686,544	69,655,906
Wyoming: Breakers and washeries [2]	4,474,723	40,266,398	1,786,177	15,608,905	87,353	492,015	6,348,253	56,367,318
Total:								
Breakers and washeries	13,089,007	106,718,300	4,914,723	37,533,775	101,548	606,808	18,105,278	144,858,883
Dredges	675,892	2,142,053	35,821	114,414	450	900	712,163	2,257,367
Grand total:								
1960	13,764,899	108,860,353	4,950,544	37,648,189	101,998	607,708	18,817,441	147,116,250
1959	15,712,188	134,022,740	4,808,513	37,529,932	128,585	767,241	20,649,286	172,319,913
Change, percent	−12.4	−18.8	+2.3	+0.3	−20.2	−20.8	−8.9	−14.6

[1] Value given for shipments is value at which coal left possession of producing company; does not include margins of separately incorporated sales companies.
[2] Includes Sullivan County.

TABLE 12.—Pennsylvania anthracite produced in 1960, by counties

County	Shipments outside producing region		Sold to local trade		Colliery fuel		Total production	
	Net tons	Value [1]	Net tons	Value	Net tons	Value	Net tons	Value [1]
Carbon	449,998	$3,352,245	211,167	$319,863			661,165	$3,672,108
Columbia	489,993	4,168,107	51,768	436,939	1,356	$9,808	543,117	4,614,854
Dauphin	129,306	592,608	31,524	119,861			160,830	712,469
Lackawanna	1,281,144	10,892,090	566,425	6,237,319	43,876	225,756	1,891,445	17,355,165
Lancaster, Lebanon, Northampton, and Snyder [2]	600,817	1,804,243	4,170	22,510			604,987	1,826,753
Luzerne	4,071,386	36,781,842	1,529,500	12,018,792	50,329	323,033	5,651,215	49,123,667
Northumberland	1,322,424	9,556,124	1,031,283	6,140,688	1,031	5,157	2,354,738	15,701,969
Schuylkill	5,410,452	41,643,660	1,520,153	12,301,004	5,396	43,854	6,936,001	53,988,518
Sullivan	8,332	61,047	3,354	36,698	10	100	11,696	97,845
Susquehanna and Wayne	1,047	8,387	1,200	14,515			2,247	22,902
Total	13,764,899	108,860,353	4,950,544	37,648,189	101,998	607,708	18,817,441	147,116,250

[1] Value given is value at which coal left possession of producing company; does not include margins of separately incorporated sales companies.
[2] Counties producing dredge coal only.

Underground Mines.—Underground production slumped sharply in 1960, as the industry accelerated its efforts to satisfy a greater proportion of the available market from lower cost, alternate sources. The total produced underground slipped 18 percent below 1959. The effect of the industry's economy drive and depletion of reserves was most apparent in the Lehigh region, where underground production fell 68 percent below 1959. In the Schuylkill region, output at deep mines fell 9 percent, while in the Wyoming, where excessive mine water and surface subsidences placed additional burdens on deep-mine operators, underground production dropped 17 percent below the 1959 level. As a result of these regional differences, the Schuylkill region contributed 48 percent of the coal produced underground in 1960, compared with 43 percent in 1959. The Wyoming's share increased from 47 percent of the underground total in 1959 to 48 percent, but the Lehigh tumbled from 10 percent in 1959 to only 4 percent. Detailed data on production by source, fields, and regions will be found in tables 8 to 11. Figure 2 shows trends in production by sources, 1949–60.

Strip Pits.—Despite the decline in demand for anthracite, 7.1 million tons was produced at strip-pit operations in 1960. Although this represented a gain of only a fraction of 1 percent over 1959, the total represented 38 percent of the output in 1960, a record high. Stripping operations also accounted for proportionately more of total production in each of the three regions. For example, of the total fresh-mined coal (strip and underground) produced in the Lehigh region, 85 percent originated at strip pits, compared with 65 percent

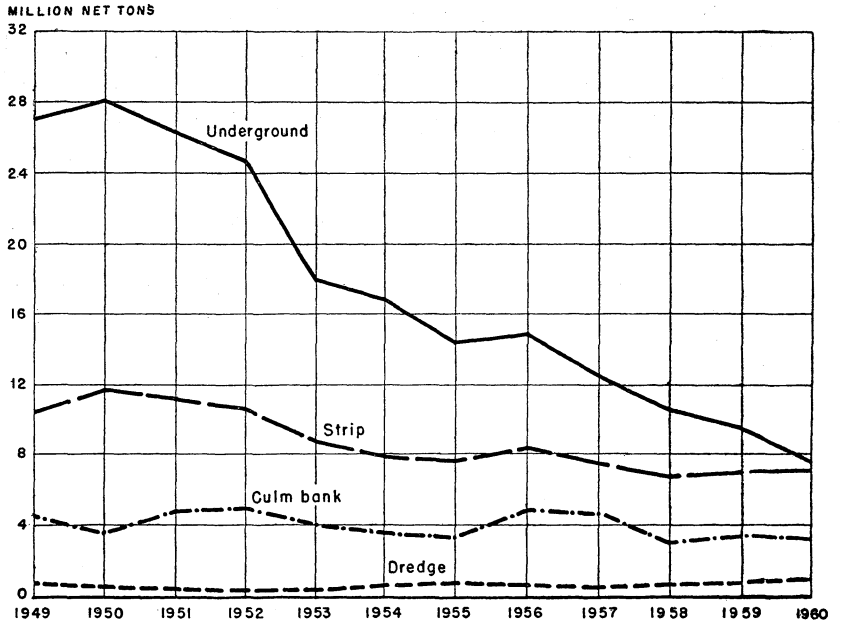

FIGURE 2.—Production of Pennsylvania anthracite, by sources, 1949–60.

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in 1959. In the Schuylkill, 50 percent came from open pits in 1960, compared with 47 percent in 1959; in the Wyoming region, the comparable figures were 32 and 29 percent.

As in recent years, the Schuylkill region again led in strip-pit production with 53 percent of the 1960 total, a 2-point gain, followed

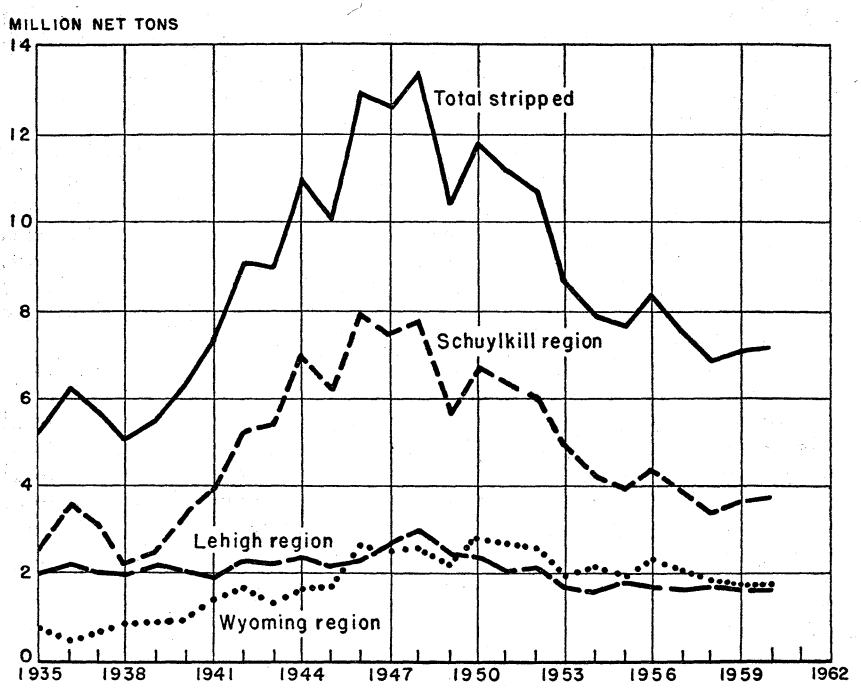

FIGURE 3.—Pennsylvania anthracite mined from strip pits by regions, 1935–60.

TABLE 13.—Production of Pennsylvania anthracite from strip pits

	Mined by stripping (net tons)	Percent of fresh-mined total that was stripped	Number of men employed	Average number of days worked
1915	1,121,603	(1)	(1)	(1)
1920	2,054,441	2.5	(1)	(1)
1925	1,578,478	2.7	(1)	(1)
1930	2,536,288	3.8	(1)	(1)
1953	8,606,482	32.5	6,168	193
1954	7,939,680	32.0	4,837	202
1955	7,703,907	34.7	[2] 4,642	205
1956	8,354,230	35.7	4,840	216
1957	7,543,157	37.4	4,546	207
1958	6,877,761	39.1	4,418	196
1959	7,096,343	43.0	3,775	200
1960:				
Lehigh region	1,640,256	84.8	977	192
Schuylkill region	3,743,971	50.4	1,692	190
Wyoming region [3]	1,728,061	31.8	801	207
Total	7,112,288	48.0	3,470	195

[1] Data not available.
[2] Estimated.
[3] Includes Sullivan County.

by the Wyoming region with 24 percent and the Lehigh region with 23 percent, each representing a 1-point drop from 1959. Regional strip production varied little, however, as declines of only 2 and 3 percent occurred in the Lehigh and Wyoming regions respectively; the Schuylkill registered an increase of 3 percent. Detailed data on strip-pit production for selected years in the period 1915–60 are presented in table 13. Figure 3 shows trends in the regional production of strip coal, 1935–60.

Culm-Bank Coal.—Apparently as the result of the substantial decline in underground production, operators in the Wyoming region stepped up production from culm banks to meet the demand for the smaller sizes. Consequently, of the total recovered from banks in 1960, 28 percent came from that region (20 percent in 1959). Of the remainder, 47 percent originated in the Schuylkill region (56 percent in 1959) and 25 percent in the Lehigh region (24 percent in 1959). On a comparative basis, the output from banks dropped 4 percent below 1959, with decreases of 1 and 18 percent respectively, in the Lehigh and Schuylkill regions, and an increase of 33 percent in the Wyoming region. The production of Pennsylvania anthracite from culm banks, by fields and regions, is shown in tables 9, 10, and 14.

TABLE 14.—Production of Pennsylvania anthracite from culm banks, by regions, in net tons

Year	Lehigh	Schuylkill	Wyoming	Sullivan County	Total
1935	192,790	1,748,960	760,718		2,702,468
1936	136,058	2,532,116	525,798		3,193,972
1937	101,239	2,178,482	442,878		2,722,599
1938	53,037	1,941,896	345,511		2,340,444
1939	64,180	2,159,548	360,086		2,583,814
1940	192,878	2,109,557	480,603		2,783,038
1941	326,755	2,881,049	449,062		3,656,866
1942	745,934	3,529,757	459,373		4,735,064
1943	1,944,047	4,577,917	1,041,841	19,893	7,583,698
1944	2,125,317	5,787,036	1,673,994	13,833	9,600,180
1945	2,086,864	4,936,907	1,728,440	34,448	8,786,659
1946	1,875,590	4,752,141	1,780,874	22,487	8,431,092
1947	1,044,501	3,947,016	1,409,217	2,912	6,403,646
1948	796,114	3,729,542	1,098,123		5,623,779
1949	694,763	2,778,131	956,250		4,429,144
1950	366,069	2,533,535	565,829	1,877	3,467,310
1951	566,613	3,578,795	484,792		4,630,200
1952	791,445	3,407,974	566,097		4,765,516
1953	714,646	2,792,323	504,031		4,011,000
1954	797,761	2,320,006	447,715		3,565,482
1955	862,539	1,934,492	416,015		3,213,046
1956	1,493,381	2,750,838	530,580		4,774,799
1957	1,457,869	2,479,241	584,300		4,521,410
1958	605,741	1,742,356	550,756	3,900	2,902,753
1959	831,254	1,905,465	[1] 684,135	(1)	3,420,854
1960	825,825	1,563,746	[1] 907,441	(1)	3,297,01

[1] Sullivan County included in Wyoming region.

Dredge Coal.—Dredging operations were conducted at virtually the same pace as in 1959, and the total of 712,000 tons was only 4,000 tons less than the figure for 1959. Detailed information on the production and value of dredge coal, by river of origin, is presented in tables 15 and 16. However, the value data are not strictly comparable for all

years because one large operator, who usually produces the bulk of the total, reported cost of production rather than an open market price for 1956–58.

TABLE 15.—Pennsylvania anthracite produced by dredges in 1960, by rivers (including tributaries)

River	Production (net tons)	Value	
		Total	Average
Lehigh	22,700	$111,500	$4.91
Schuylkill	23,624	114,390	4.84
Susquehanna	665,839	2,031,477	3.05
Total	712,163	2,257,367	3.17

TABLE 16.—Pennsylvania anthracite produced by dredges, by rivers (including tributaries)

Year	Net tons				Value	
	Lehigh River	Schuylkill River	Susquehanna River	Total	Total	Average per ton
1940	[1] 78,947	(1)	863,997	942,944	$1,097,000	$1.16
1941	47,838	396,522	1,073,203	1,517,563	1,839,784	1.21
1942	9,385	268,919	1,006,729	1,285,033	1,478,719	1.15
1943	37,452	342,815	954,470	1,334,737	1,972,777	1.48
1944	40,894	494,371	837,472	1,372,737	2,084,431	1.52
1945	41,409	366,161	797,656	1,205,226	1,924,148	1.60
1946	37,441	247,757	847,196	1,132,394	2,091,324	1.85
1947	46,478	158,102	1,015,126	1,219,706	2,480,068	2.03
1948	54,284	67,871	865,849	988,004	2,291,752	2.32
1949	22,131	52,012	790,979	865,122	2,131,096	2.46
1950	21,877	34,222	563,465	619,564	1,677,508	2.71
1951	25,344	27,454	508,770	561,568	1,576,576	2.81
1952	17,402	30,407	324,245	372,054	1,109,778	2.98
1953	31,391	20,643	386,147	438,181	1,449,149	3.31
1954	16,015	----------	709,892	725,907	1,810,026	2.49
1955	29,935	60,256	698,652	788,843	1,844,835	2.34
1956	44,262	5,540	666,485	716,287	1,273,415	1.78
1957	30,650	10,167	616,884	657,701	1,143,152	1.74
1958	30,763	10,230	650,800	691,793	1,324,943	1.92
1959	13,312	13,213	690,094	716,619	2,310,895	3.22
1960	22,700	23,624	665,839	712,163	2,257,367	3.17

[1] Schuylkill included with Lehigh in 1940.

Weekly and Monthly Data.—The Bureau of Mines publishes estimates of the weekly and monthly production of Pennsylvania anthracite in a series of Weekly Anthracite Reports which may be obtained free upon request to the Bureau of Mines, Washington 25, D.C. These estimates are based upon weekly carloading data supplied by the Association of American Railroads, which are modified by statistical factors derived from data on truck shipments compiled by the Pennsylvania Department of Mines and Mineral Industries, and annual data on dredge coal and colliery fuel obtained by the Bureau of Mines. The weekly and monthly estimates are later adjusted to the total annual production figure. (See tables 17 and 18.) Regular monthly

supplements to these reports include such salient statistics as rail and truck shipments, the Lake-dock trade, producers' stocks, retail-dealer stocks and deliveries, imports, exports, consumption, wholesale price indexes, average earnings, and working time.

TABLE 17.—Estimated weekly production of Pennsylvania anthracite in 1960[1]

Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons	Week ended—	Thousand net tons
Jan. 2	(2)	Apr. 9	271	July 16	354	Oct. 22	377
9	417	16	368	23	404	29	401
16	458	23	286	30	373	Nov. 5	403
23	379	30	318	Aug. 6	357	12	399
30	447	May 7	289	13	343	19	392
Feb. 6	399	14	308	20	356	26	340
13	359	21	302	27	377	Dec. 3	387
20	405	28	326	Sept. 3	391	10	418
27	385	June 4	306	10	311	17	420
Mar. 5	327	11	369	17	383	24	439
12	395	18	390	24	394	31	380
19	404	25	460	Oct. 1	378		
26	376	July 2	71	8	392	Total	18,817
Apr. 2	380	9	43	15	410		

[1] Estimated from weekly carloadings as reported by the Association of American Railroads; adjusted to annual production total from Bureau of Mines canvass.
[2] Figures represent output of working days in that part of week included in calendar year 1960. Revised total for week of January 2, 1960, was 338,000 net tons.

TABLE 18.—Estimated monthly production of Pennsylvania anthracite, in thousand net tons[1]

Month	1953	1954	1955	1956	1957	1958	1959	1960
January	2,707	2,874	2,454	2,743	2,625	2,161	2,318	1,701
February	2,438	2,525	2,568	2,360	2,072	1,753	1,645	1,643
March	2,354	2,364	2,007	2,052	1,798	1,476	1,593	1,749
April	2,048	2,100	1,723	2,258	2,037	1,545	1,588	1,281
May	2,869	2,013	1,985	1,947	2,294	1,612	1,466	1,313
June	2,975	2,387	2,130	2,470	2,551	1,963	1,777	1,496
July	2,551	2,080	1,845	1,890	1,478	1,377	1,206	1,186
August	2,452	2,270	1,904	2,729	2,294	1,750	1,600	1,704
September	2,732	2,416	2,453	2,509	2,173	2,050	1,823	1,580
October	2,994	2,353	2,244	2,971	2,262	1,966	1,805	1,678
November	2,386	2,681	2,385	2,629	1,928	1,559	1,863	1,692
December	2,443	3,020	2,507	2,342	1,826	1,959	1,965	1,794
Total	30,949	29,083	26,205	28,900	25,338	21,171	20,649	18,817

[1] Production is estimated from weekly carloadings as reported by the Association of American Railroads and includes mine fuel, coal sold locally, and dredge coal.

Mechanical Loading.—Owing to the substantial decline in underground production, the quantity of anthracite loaded mechanically fell also, but not as sharply as that loaded by hand. For mechnical loading underground, the decline between 1959 and 1960 was 14 percent and for hand loading, 23 percent. This difference led to a further increase in the proportion of underground production loaded mechanically—53 percent, compared with 50 percent in 1959. Another result was a reduction of 17 percent in the number of loading units reported in use in 1960.

Of the total coal loaded mechanically underground in 1960, 81 percent was in the Northern field, where the relatively flat seams are more amenable to mechanization, 12 percent in the Southern, 5 percent in the Western Middle, and only 2 percent in the Eastern Middle. Com-

pared with 1959, mechanical loading underground dropped 45 percent in the Eastern Middle field, 30 percent in the Western Middle, and 15 percent in the Northern. In the Southern field, the tonnage loaded mechanically exceeded that in 1959 by 20 percent. Statistics on mechanical loading and equipment are shown in tables 19 to 21. Figure 4 shows trends in hand loading, mechanical loading, and stripping, 1935–60.

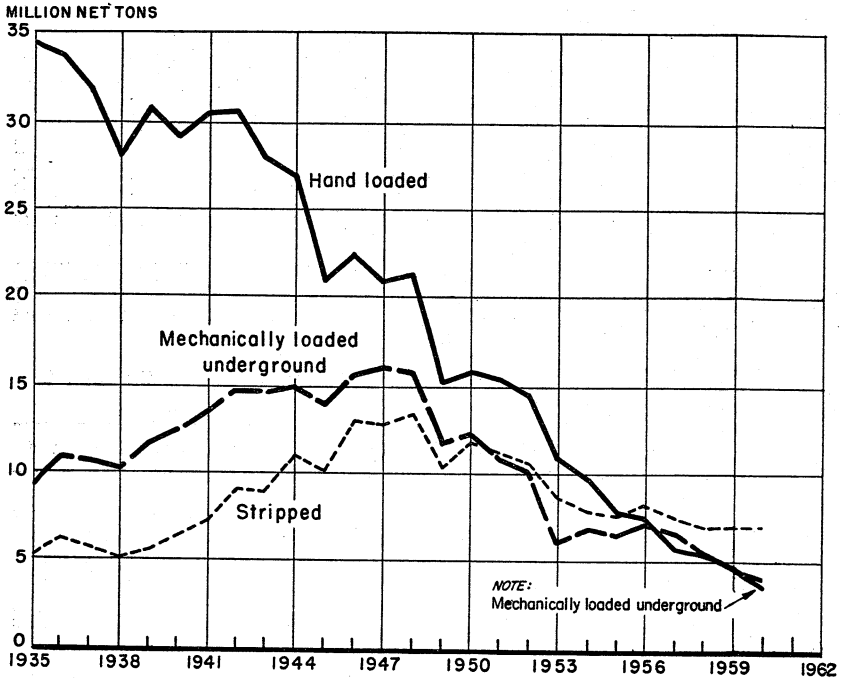

FIGURE 4.—Pennsylvania anthracite mechanically loaded, hand loaded, and stripped, 1935–60.

TABLE 19.—Pennsylvania anthracite loaded mechanically underground, by fields, in net tons

Field	Scraper loaders [1]		Pit-car loaders		Hand-loaded face conveyors, all types [2]		Total mechanically loaded	
	1959	1960	1959	1960	1959	1960	1959	1960
Northern	1,216,419	1,052,054	16,501	-------	2,607,724	2,219,795	3,840,644	3,271,849
Eastern Middle	80,764	42,825	-------	-------	86,594	49,527	167,358	92,352
Western Middle	56,048	39,875	-------	-------	246,972	172,312	303,020	212,187
Southern	110,542	82,670	3,000	12,503	275,978	372,831	389,520	468,004
Total	1,463,773	1,217,424	19,501	12,503	3,217,268	2,814,465	4,700,542	4,044,392

[1] Includes mobile loaders.
[2] Shaker chutes, including those equipped with duckbills.

TABLE 20.—Pennsylvania anthracite loaded mechanically underground

Year	Scraper loaders		Mobile loaders		Conveyors [1] and pit-car loaders		Total loaded mechanically	
	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded	Number of units	Net tons loaded
1956	303	1,080,339	80	1,077,412	1,593	5,150,359	1,976	7,308,110
1957	295	1,179,099	66	799,493	1,437	4,678,887	1,798	6,657,479
1958	290	931,313	51	658,549	1,234	3,742,181	1,575	5,332,043
1959	186	771,142	46	692,631	869	3,236,769	1,101	4,700,542
1960	114	525,482	45	691,942	754	2,826,968	913	4,044,392

[1] Includes duckbills and other self-loading conveyors.

TABLE 21.—Trends in mechanical loading, hand loading, and stripping of Pennsylvania anthracite

(Mechanical loading includes coal handled on pit-car loaders and hand-loaded face conveyors)

Year	Fresh mined coal							Total
	Underground					From strip pits		
	Mechanical loading (net tons)	Percent of total underground	Hand loading (net tons)	Percent of total underground	Total (net tons)	Net tons	Percent of total fresh mined	
1927	[1] 2,223,281	3.0	71,434,537	97.0	73,657,818	2,153,156	2.8	75,810,974
1928	[1] 2,351,074	3.4	67,373,788	96.6	69,724,862	2,422,924	3.4	72,147,786
1929	3,470,158	5.0	66,493,690	95.0	69,963,848	1,911,766	2.7	71,875,614
1930	4,467,750	6.9	60,458,344	93.1	64,926,094	2,536,288	3.8	67,462,382
1931	4,384,780	8.2	49,074,722	91.8	53,459,502	3,813,237	6.7	57,272,739
1932	5,433,340	12.4	38,400,820	87.6	43,834,160	3,980,973	8.3	47,815,133
1933	6,557,267	16.0	34,474,844	84.0	41,032,111	4,932,069	10.7	45,964,180
1934	9,284,486	19.1	39,290,255	80.9	48,574,741	5,798,138	10.7	54,372,879
1935	9,279,057	21.2	34,503,819	78.8	43,782,876	5,187,072	10.6	48,969,948
1936	10,827,946	24.2	33,898,560	75.8	44,726,506	6,203,267	12.2	50,929,773
1937	10,683,837	25.1	31,882,514	74.9	42,566,351	5,696,018	11.8	48,262,369
1938	10,151,669	26.6	27,990,628	73.4	38,142,297	5,095,341	11.8	43,237,638
1939	11,773,833	27.7	30,797,715	72.3	42,571,548	5,486,479	11.4	48,058,027
1940	12,326,000	29.7	29,190,837	70.3	41,516,837	6,352,700	13.3	47,869,537
1941	13,441,987	30.6	30,435,277	69.4	43,877,264	7,316,574	14.3	51,193,838
1942	14,741,459	32.6	30,495,240	67.4	45,236,699	9,070,933	16.7	54,307,632
1943	14,745,793	34.5	27,990,005	65.5	42,735,798	8,989,387	17.4	51,725,185
1944	14,975,146	35.8	26,800,270	64.2	41,775,416	10,953,030	20.8	52,728,446
1945	13,927,955	39.9	20,957,744	60.1	34,885,699	10,056,325	22.4	44,942,024
1946	15,619,162	41.0	22,465,295	59.0	38,084,457	12,858,930	25.2	50,943,387
1947	16,054,011	43.4	20,909,101	56.6	36,963,112	12,603,545	25.4	49,566,657
1948	15,742,368	42.3	21,432,923	57.7	37,175,291	13,352,874	26.4	50,528,165
1949	11,858,088	43.9	15,172,562	56.1	27,030,650	10,376,808	27.7	37,407,458
1950	12,335,650	43.8	15,820,245	56.2	28,155,895	11,833,934	29.6	39,989,829
1951	10,847,787	41.2	15,494,452	58.8	26,342,239	11,135,990	29.7	37,478,229
1952	10,034,464	40.5	14,713,819	59.5	24,748,283	10,696,705	30.2	35,444,988
1953	6,838,769	38.2	11,054,720	61.8	17,893,489	8,606,482	32.5	26,499,971
1954	6,978,035	41.4	9,874,373	58.6	16,852,408	7,939,680	32.0	24,792,088
1955	6,660,939	45.9	7,837,819	54.1	14,498,758	7,703,907	34.7	22,202,665
1956	7,308,110	48.5	7,746,794	51.5	15,054,904	8,354,230	35.7	23,409,134
1957	6,657,479	52.8	5,958,574	47.2	12,616,053	7,543,157	37.4	20,159,210
1958	5,332,043	49.8	5,366,792	50.2	10,698,835	6,877,761	39.1	17,576,596
1959	4,700,542	49.9	4,714,928	50.1	9,415,470	7,096,343	43.0	16,511,813
1960	4,044,392	52.6	3,651,586	47.4	7,695,978	7,112,288	48.0	14,808,266

[1] As reported by Commonwealth of Pennsylvania, Department of Mines.

Cutting Machines.—Only an insignificant percentage of the anthracite produced annually is undercut prior to shooting because of the steep pitches encountered. Although seven machines were reported used in 1960 (five in 1959), the tonnage undercut declined from 261,000 tons in 1959 to 226,000 tons in 1960, all of which was produced in the Wyoming region.

Power Equipment.—Nine less pieces of power equipment were reported in use in 1960. Though 2 more shovels were reported, 11 fewer draglines were used. At strip pits, 143 shovels were reported in use, the same as in 1959, but the number of draglines declined from 206 to 189. A total of 27 shovels and 37 draglines was employed in culm-bank operations—the same number of shovels as in 1959, but 6 more draglines. Four draglines were reported used in both strip and culm-bank recovery work. Table 22 presents detailed data on the power equipment used by the anthracite industry, 1958–60.

TABLE 22.—Power shovels and draglines used in recovering coal from culm banks and in stripping Pennsylvania anthracite, by type of power

Type of power	1958			1959			1960		
	Number of power shovels	Number of drag-lines	Total	Number of power shovels	Number of drag-lines	Total	Number of power shovels	Number of drag-lines	Total
Gasoline	23	8	31	14	6	20	23	11	34
Electric	47	48	95	51	45	96	43	51	94
Diesel	109	189	298	103	182	285	104	160	264
Steam									
Total	179	245	424	168	233	401	170	222	392

Flotation Equipment.—Subsequent to limited research on froth flotation of anthracite about 1938, the first flotation plant was installed in the producing region as an adjunct to a large preparation plant. A principal objective of this first plant was to prevent stream pollution as well as to prepare a product for market.

Flotation currently is used on raw anthracite fines sized generally between 10- and 200-mesh. The raw fines are obtained from current operations of preparation plants, from old silt banks and settling ponds, or from river deposits. The floated products are used for a variety of purposes, of which powerplant fuel use is the most important.

A Bureau survey, part of the 50th anniversary of froth flotation, disclosed that five flotation plants were active in the anthracite region during 1960. In addition, two plants were idle, and a third was being planned for installation in a new preparation plant.

The five active plants, with an aggregate capacity of 5,000 tons of raw coal feed per 24-hour day, treated an estimated 800,000 tons of raw fines in the flotation cells. From this feed about 425,000 tons of clean coal with an ash content ranging from 8 to 16 percent was obtained in 1960.

SIZE OF DEEP MINES

Anthracite production in 1960 was obtained from 1,055 deep mines, 174 strip mines, 110 culm and silt banks, and 26 dredges. The raw material from the mines and banks was sized and cleaned in 170 preparation plants. All dredge operations sized and cleaned the product as it was recovered from the river, except for one operation where the dredged material was prepared in a froth-flotation plant.

Breakdowns of the large number of underground mines into tonnage and employment groupings illustrate the preponderance of small producing-units as well as the wide range in size of individual units. It is observed from table 23 that 88 percent of the mines produced less than 10,000 tons each in 1960. This group employed 30 percent of the men working at deep mines, but produced only 22 percent of the total underground coal. In contrast, 1 percent, or 12 deep mines, employed 34 percent of the men but produced 37 percent of the coal at underground operations in 1960.

When separated into employment size groups, as in table 24, 89 percent of the deep mines had less than 10 employees. This group of

TABLE 23.—Production of Pennsylvania anthracite at underground mines in 1960, by production size groups

Production groups	Mines		Average men working		Production [1]	
	Number	Percent of total	Number	Percent of total	Net tons	Percent of total
Less than 10,000 tons	927	88	3,500	30	1,738,456	22
10,000–24,999 tons	72	7	842	7	1,062,958	14
25,000–49,999 tons	27	2	1,060	9	905,272	12
50,000–99,999 tons	17	2	1,862	16	1,135,283	15
100,000 and more tons	12	1	4,017	34	2,905,130	37
Unassigned surface units [2]			442	4		
Total	1,055	100	11,723	100	7,747,099	100

[1] Production from underground mines, collected by separate canvass for injury and employment data on Bureau questionnaire No. 6–1420A, totals 51,121 tons or 0.7 percent more than the total obtained from the Bureau's production questionnaire No. 6–1385A.
[2] Employment at 14 general shops and yards not assignable to any single mine.

TABLE 24.—Production of Pennsylvania anthracite at underground mines in 1960, by employment size groups

Employment groups	Mines		Average men working		Production [1]	
	Number	Percent of total	Number	Percent of total	Net tons	Percent of total
Less than 10 employees	935	89	3,266	28	2,058,354	27
10–24 employees	70	7	945	8	1,063,165	14
25–74 employees	22	2	879	7	734,262	9
75–149 employees	17	1	1,861	16	1,319,661	17
150 and more employees	11	1	4,330	37	2,571,657	33
Unassigned surface employees [2]			442	4		
Total	1,055	100	11,723	100	7,747,099	100

[1] Production from underground mines, collected by separate canvass for injury and employment data on Bureau questionnaire No. 6–1420A, totals 51,121 tons, or 0.7 percent, more than the total obtained from the Bureau's production questionnaire No. 6–1385A.
[2] Employment at 14 general shops and yards not assignable to any single mine.

small mines accounted for 28 percent of the employment and 27 percent of the output from deep mines in 1960. At the other extreme, the 11 mines with 150 or more employees had 37 percent of the men working and 33 percent of the total production at deep mines.

PRICES AND VALUE OF SALES

Owing to the intensive competition created by the overall decline in demand for anthracite, average f.o.b. mine values shrunk further in 1960. The average value of $7.82 per net ton not only represented a decline of $0.53 per ton—the same as occurred between 1958 and 1959—but was the lowest since 1947. Disproportionate shipments of the various sizes also adversely affected the industry's revenue. Shipments of the higher priced Pea and larger sizes declined 13 percent, whereas the Buckwheat and smaller-size category fell only 6 percent. Thus, the value of year's output fell 15 percent ($172.3 million in 1959 to $147.1 million in 1960), in contrast to the decrease of 9 percent in production.

The average value of each size was less than in 1959, with the exception of Buckwheat No. 4, which increased 1 cent. Based on total shipments, average values for the Pea and larger and for Buckwheat No. 1 and smaller categories declined about the same, 6 and 5 percent, respectively. However, on shipments to points outside the producing region prices declined relatively more than for coal sold to the local trade. In the region, for instance, Pea and larger sizes sold for only 4 percent less per ton than in 1959, whereas the same sizes dropped about 6 percent per ton outside the region. Similarly, the Buckwheat range of sizes dropped a little more than 1 percent in value per ton in the region, but 6 percent in more distant markets.

For the Pea and larger sizes, the price declines were directly proportionate to the size of the coal, with Broken and Lump (the largest) showing the greatest drop, 11 percent; followed by Egg, 10 percent; Stove, 6 percent; and Chestnut and Pea, 5 percent. Among the Buckwheats the largest loss in value per ton was that for "Other" sizes (7 percent); followed by No. 1, with a decrease of 5 percent; No. 2 (Rice), 4 percent; No. 5, 2 percent; and No. 3 (Barley), 1 percent. The 1-cent gain in the average received for No. 4 was due entirely to sales within the producing region since this size also brought less in outside markets.

Quotations shown in Saward's Journal also reflected the downward trend in prices of anthracite. In the December 31, 1960 issue the following price ranges appeared: Broken, $14.75; Egg, $12.45–$14.75; Stove and Chestnut, $11.50–$14.75; Pea, $9.50–$12.25; Buckwheat No. 1, $9.25–$11.25; No. 2 (Rice), $9.00–$10.75; and No. 3 (Barley), $8.15–$8.50. These quotations for "Standard" anthracite, specifications for which appear in table 25, were less than those quoted near the close of 1959 for each size except Buckwheat No. 3, which was unchanged. Saward's does not publish quotations on Buckwheat No. 4 and smaller, as these sizes are usually sold on contract at negotiated prices.

Table 26 presents retail prices of selected fuels in certain cities. The average values received f.o.b. mines are shown by regions in tables 27

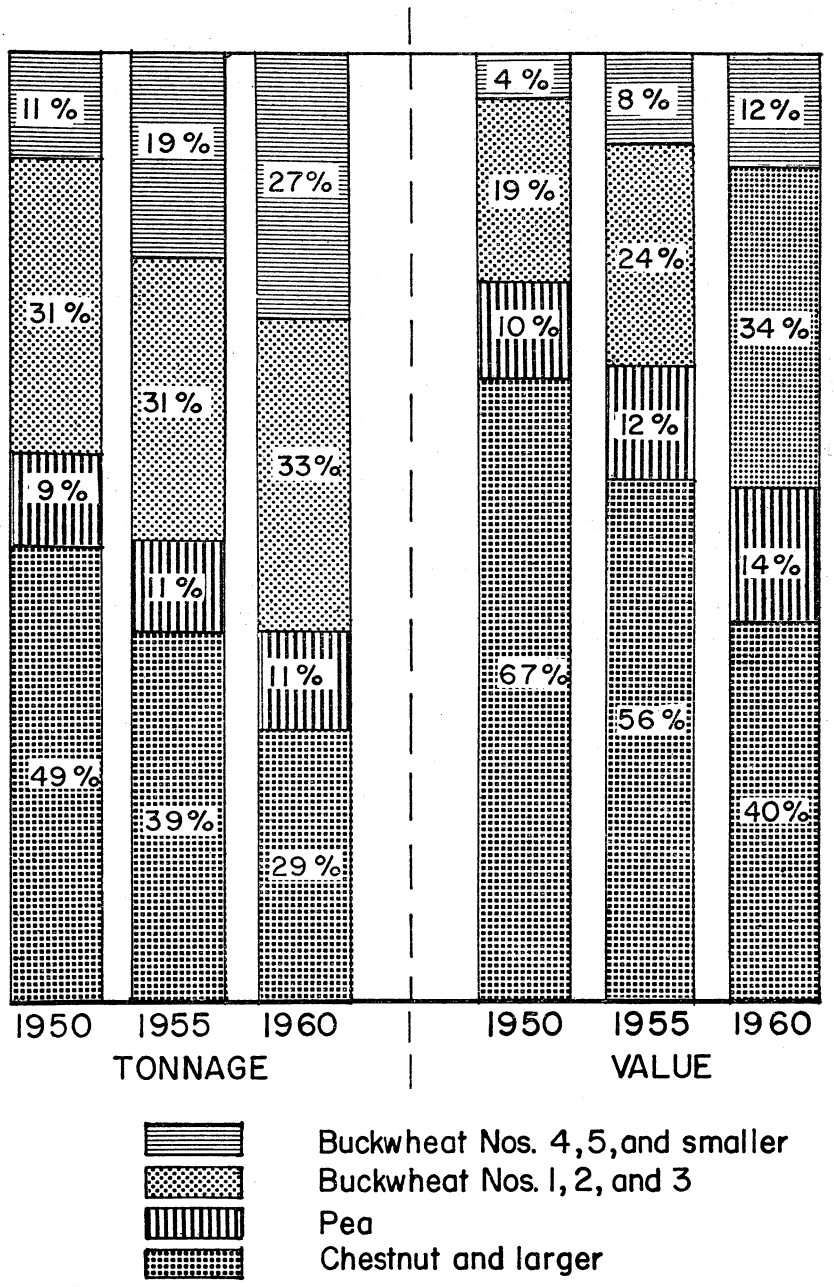

FIGURE 5.—Shipments of Pennsylvania anthracite, 1950, 1955, and 1960, by size groups, in percent of total tonnage and total value

to 30. Figure 5 shows trends in shipments and revenue received for 1950, 1955, and 1960, by size groups, in percent of total.

TABLE 25.—Standard anthracite specifications approved and adopted by the Anthracite Committee, effective July 28, 1947

Size	Round test mesh (inches)	Percent					
		Oversize, maximum	Undersize		Maximum impurities [1]		
			Maximum	Minimum	Slate	Bone	Ash [2]
Broken	Through 4⅜				1½	2	11
	Over 3¼ to 3		15	7½			
Egg	Through 3¼ to 3	5			1½	2	11
	Over 2 7/16		15	7½			
Stove	Through 2 7/16	7½			2	3	11
	Over 1⅝		15	7½			
Chestnut	Through 1⅝	7½			3	4	11
	Over 1 3/16		15	7½			
Pea	Through 1 3/16	10			4	5	12
	Over 9/16		15	7½			
Buckwheat No. 1	Through 9/16	10					13
	Over 5/16		15	7½			
Buckwheat No. 2 (Rice)	Through 5/16	10					13
	Over 3/16		17	7½			
Buckwheat No. 3 (Barley)	Through 3/16	10					15
	Over 3/32		20	10			
Buckwheat No. 4	Through 3/32	20					15
	Over 3/64		30	10			
Buckwheat No. 5	Through 3/64	30	No limit				16

[1] When slate content in the sizes from Broken to Chestnut, inclusive, is less than above standards, bone content may be increased by 1½ times the decrease in the slate content under the allowable limits, but slate content specified above shall not be exceeded in any event.

A tolerance of 1 percent is allowed on the maximum percentage of undersize and the maximum percentage of ash content.

The maximum percentage of undersize is applicable only to anthracite as it is produced at the preparation plant. Slate is defined as any material that has less than 40 percent fixed carbon.

Bone is defined as any material that has 40 percent or more, but less than 75 percent, fixed carbon.

[2] Ash determinations are on a dry basis.

TABLE 26.—Retail prices of selected fuels in 1960, by months, for various cities [1]

(Coal and coke, per net ton; heating oil, per 100 gallons)

City and fuel	January	February	March	April	May	June	July	August	September	October	November	December
Baltimore, Md.:												
Anthracite:												
Stove	$22.99	$22.99	$22.99	$22.99	$22.28	$22.28	$22.28	$22.28	$22.49	$22.49	$22.66	$22.66
Buckwheat No. 1	19.57	19.57	19.57	19.57	19.23	19.23	19.23	19.23	19.23	19.23	19.40	19.40
Heating oil: Fuel oil No. 2	15.04	14.92	14.21	14.21	14.21	13.99	13.95	13.90	13.90	14.21	13.90	14.38
Boston, Mass.:												
Anthracite:												
Stove	31.25	31.25	31.25	31.25	30.38	30.38	30.62	30.88	30.88	30.88	31.25	31.25
Buckwheat No. 1	25.25	25.25	25.25	25.25	25.00	25.00	25.12	25.25	25.25	25.25	25.38	25.44
Heating oil: Fuel oil No. 2	15.28	15.38	14.53	14.53	14.53	14.48	14.48	14.48	14.57	14.87	14.67	15.02
New York, N.Y.:												
Anthracite:												
Stove	26.21	26.21	26.21	26.21	25.45	25.45	25.64	25.64	25.64	26.13	26.16	26.16
Pea	22.57	22.57	22.57	22.57	21.88	21.88	22.03	22.03	22.03	22.44	22.59	22.59
Buckwheat No. 1	21.09	21.09	21.09	21.09	20.33	20.33	20.59	20.59	20.59	20.91	21.20	21.20
Heating oil: Fuel oil No. 2	15.23	15.29	14.67	14.67	14.67	14.61	14.55	14.55	14.67	14.92	14.80	15.27
Philadelphia, Pa.:												
Anthracite:												
Chestnut	23.78	24.45	24.45	24.45	21.45	20.12	20.45	21.12	21.12	21.12	21.78	21.78
Buckwheat No. 1	20.95	20.95	20.95	20.95	19.28	17.95	17.95	18.45	18.45	18.45	18.95	19.28
Heating oil: Fuel oil No. 2	14.98	14.56	14.14	14.14	14.14	13.99	13.91	13.83	14.14	14.46	14.14	14.35
Washington, D.C.:												
Anthracite:												
Chestnut	27.93	27.93	27.93	27.93	23.71	23.70	24.51	25.33	25.33	26.24	26.84	26.84
Buckwheat No. 1	21.26	21.26	21.26	21.27	20.02	20.13	20.45	20.82	20.82	21.02	21.06	21.10
Heating oil: Fuel oil No. 2	15.14	15.14	14.33	14.32	14.32	14.08	14.02	14.02	14.02	14.32	14.08	14.67

[1] Compiled from reports of Bureau of Labor Statistics. Prices are as of the 15th of each month. Data are preliminary. Sales tax included where applicable.

TABLE 27.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points outside producing region, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region					Schuylkill region				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	$12.78	$14.12	$11.99	$13.00	-------	$12.19	$14.67	$13.76	$12.22	$10.53
Egg	11.61	13.12	12.03	12.09	$10.25	11.93	13.28	12.10	11.27	10.22
Stove	11.94	13.54	12.85	11.87	10.55	11.95	12.81	11.92	11.08	10.33
Chestnut	12.02	13.56	13.02	11.97	10.74	11.87	12.82	11.93	11.12	10.51
Pea	8.50	10.39	9.97	9.58	8.83	8.77	10.36	9.69	9.06	8.41
Total Pea and larger	11.25	12.76	12.19	11.31	10.18	11.24	12.28	11.46	10.62	9.94
Buckwheat No. 1	7.25	9.53	9.30	8.92	8.33	6.95	9.13	8.82	8.58	8.05
Buckwheat No. 2 (Rice)	6.85	8.50	8.94	9.09	8.36	6.50	8.27	8.48	8.40	7.89
Buckwheat No. 3 (Barley)	5.38	6.48	6.88	7.51	7.14	5.35	6.38	6.62	6.98	6.89
Buckwheat No. 4	4.19	5.08	5.01	5.13	5.05	4.05	4.81	4.85	4.87	4.85
Buckwheat No. 5	3.80	4.82	4.77	4.99	4.93	3.65	4.75	4.44	4.41	4.29
Other	3.39	3.83	3.49	3.51	2.33	3.42	3.81	3.97	3.45	3.68
Total Buckwheat No. 1 and smaller	4.79	5.75	6.75	6.79	6.30	5.12	6.28	6.72	6.58	6.17
Total all sizes	7.21	8.10	9.10	8.77	8.05	7.60	8.52	8.75	8.23	7.61

Size	Wyoming region [2]					Sullivan County				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	$13.15	$12.88	$12.40	$11.84	$11.20	-------	-------	-------	[2]	[2]
Egg	11.70	12.33	11.87	11.21	10.40	-------	-------	-------		
Stove	12.06	12.97	12.17	11.27	10.68	-------	-------	$12.07		
Chestnut	12.23	13.09	12.32	11.47	10.90	$10.30	$11.00	12.14		
Pea	9.38	10.42	10.03	9.77	9.49	9.22	10.00	10.01		
Total Pea and larger	11.77	12.60	11.89	11.07	10.56	9.98	10.49	11.28	[2]	[2]
Buckwheat No. 1	7.37	9.17	9.24	8.83	8.04	-------	-------	9.65	[2]	[2]
Buckwheat No. 2 (Rice)	7.00	8.42	8.68	8.94	8.64	6.49	7.00	8.92		
Buckwheat No. 3 (Barley)	5.53	6.30	6.73	7.14	7.13	5.07	-------	6.79		
Buckwheat No. 4	4.04	4.97	5.03	5.21	5.18	-------	-------	-------		
Buckwheat No. 5	3.63	3.99	4.23	4.74	4.85	-------	-------	-------		
Other	3.42	4.19	4.40	4.22	4.39	-------	-------	4.73		
Total Buckwheat No. 1 and smaller	6.14	7.19	7.50	7.47	7.18	6.00	7.00	5.54	[2]	[2]
Total all sizes	9.77	10.45	10.15	9.48	9.00	6.89	8.90	6.91	[2]	[2]

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	$12.81	$14.35	$13.35	[2]	[2]	$12.81	$14.35	$13.35	$12.23	$10.83
Egg	11.78	12.76	11.99			11.78	12.76	11.99	11.43	10.30
Stove	12.01	12.99	12.17			12.01	12.99	12.17	11.28	10.52
Chestnut	12.07	13.06	12.28			12.07	13.06	12.28	11.41	10.72
Pea	8.95	10.39	9.87			8.95	10.39	9.87	9.42	8.85
Total Pea and larger	11.50	12.50	11.76	[2]	[2]	11.50	12.50	11.76	10.93	10.23
Buckwheat No. 1	7.16	9.21	9.05	[2]	[2]	7.16	9.21	9.05	8.73	8.09
Buckwheat No. 2 (Rice)	6.74	8.36	8.63			6.74	8.36	8.63	8.70	8.21
Buckwheat No. 3 (Barley)	5.41	6.37	6.69			5.41	6.37	6.69	7.11	7.01
Buckwheat No. 4	4.09	4.91	4.92			4.09	4.91	4.92	5.00	4.95
Buckwheat No. 5	3.69	4.73	4.54			3.69	4.73	4.54	4.61	4.49
Other	3.41	3.89	4.08			3.41	3.89	4.08	3.69	3.63
Total Buckwheat No. 1 and smaller	5.31	6.38	6.94	[2]	[2]	5.31	6.38	6.94	6.88	6.48
Total all sizes	8.33	9.11	9.31	[2]	[2]	8.33	9.11	9.31	8.77	8.15

[1] Quantity of Lump included is insignificant.
[2] Sullivan County included with Wyoming region in 1959 and 1960.

TABLE 28.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points inside producing region, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region					Schuylkill region				
	1956	1957	1958	1959	1960	1956	1957	1958	1959	1960
Lump [1] and Broken	-------	-------	-------	$12.46	-------	$11.97	$13.54	$13.29	$12.81	$11.57
Egg	$13.34	$12.50	$11.77	11.85	$9.77	12.29	13.11	12.34	11.02	10.46
Stove	13.87	13.45	12.84	12.46	11.41	11.86	12.52	11.28	10.95	10.64
Chestnut	13.65	15.10	14.62	13.48	13.06	11.94	12.50	11.62	11.05	10.67
Pea	11.20	12.72	12.58	12.10	11.78	9.20	10.47	9.71	9.34	8.93
Total Pea and larger	12.13	13.54	13.28	12.60	12.19	10.92	11.78	10.90	10.47	10.08
Buckwheat No. 1	9.81	11.20	11.00	11.11	10.69	6.93	8.95	8.62	8.65	8.36
Buckwheat No. 2 (Rice)	8.58	10.06	10.38	10.60	10.85	6.54	8.07	8.20	8.39	8.18
Buckwheat No. 3 (Barley)	6.87	7.60	7.60	7.90	8.23	5.04	5.92	6.12	6.24	6.28
Buckwheat No. 4	5.26	6.24	5.10	4.69	-------	3.33	4.16	4.05	4.29	5.04
Buckwheat No. 5	-------	3.83	3.65	4.66	4.75	2.68	3.48	2.83	4.30	4.01
Other	4.00	-------	2.04	1.85	1.58	2.82	3.41	3.10	2.32	2.28
Total Buckwheat No. 1 and smaller	8.37	9.95	5.95	4.85	4.75	5.83	6.87	5.40	5.05	5.56
Total all sizes	10.23	11.67	8.11	6.40	6.13	8.52	9.20	7.40	6.79	7.24

Size	Wyoming region [2]					Sullivan County				
Lump [1] and Broken	$11.30	$13.02	-------	-------	-------	-------	-------	-------	(2)	(2)
Egg	12.54	12.89	$13.65	$11.67	$11.22	-------	-------	-------		
Stove	13.38	14.19	13.40	12.55	12.01	-------	-------	-------		
Chestnut	13.39	14.44	14.00	13.60	12.97	$12.40	$10.93	$10.00		
Pea	10.57	11.75	12.03	12.11	11.76	11.12	10.00	9.00		
Total Pea and larger	11.45	12.59	12.64	12.54	12.12	11.91	10.56	9.54	(2)	(2)
Buckwheat No. 1	8.62	10.25	10.76	10.92	10.63	-------	-------	7.00	(2)	(2)
Buckwheat No. 2 (Rice)	7.45	8.93	9.57	10.06	9.92	7.21	7.00	-------		
Buckwheat No. 3 (Barley)	5.51	6.34	6.97	7.19	7.33	5.07	-------	-------		
Buckwheat No. 4	-------	4.34	4.63	4.87	5.45	-------	-------	-------		
Buckwheat No. 5	3.46	3.84	3.84	4.47	4.54	-------	-------	-------		
Other	2.80	2.33	2.76	2.72	1.82	-------	-------	3.30		
Total Buckwheat No. 1 and smaller	6.39	7.52	7.92	8.28	6.66	5.99	7.00	4.02	(2)	(2)
Total all sizes	8.77	9.88	10.03	10.23	8.74	10.17	9.25	5.54	(2)	(2)

Size	Total									
	Excluding Sullivan County					Including Sullivan County				
Lump [1] and Broken	$11.32	$13.04	$13.29	(2)	(2)	$11.32	$13.04	$13.29	$12.60	$11.57
Egg	12.49	12.85	12.51			12.49	12.85	12.51	11.59	10.49
Stove	12.16	12.88	11.78			12.16	12.88	11.78	11.31	10.88
Chestnut	12.61	13.43	12.76			12.61	13.42	12.76	12.07	11.54
Pea	10.20	11.46	11.43			10.20	11.46	11.43	11.20	10.69
Total Pea and larger	11.26	12.32	11.94	(2)	(2)	11.26	12.32	11.94	11.53	11.03
Buckwheat No. 1	8.04	9.84	10.01	(2)	(2)	8.04	9.84	10.01	10.03	9.67
Buckwheat No. 2 (Rice)	7.21	8.76	9.16			7.21	8.76	9.16	9.43	9.20
Buckwheat No. 3 (Barley)	5.36	6.18	6.60			5.36	6.18	6.60	6.69	6.69
Buckwheat No. 4	3.41	4.19	4.10			3.41	4.19	4.10	4.35	5.05
Buckwheat No. 5	3.37	3.76	3.37			3.37	3.76	3.37	4.34	4.22
Other	2.86	2.73	2.82			2.86	2.73	2.82	2.24	1.93
Total Buckwheat No. 1 and smaller	6.32	7.44	6.43	(2)	(2)	6.32	7.44	6.42	5.88	5.80
Total all sizes	8.77	9.73	8.58	(2)	(2)	8.77	9.73	8.57	7.84	7.64

[1] Quantity of Lump included is insignificant.
[2] Sullivan County included with Wyoming region in 1959 and 1960.

TABLE 29.—Average sales realization per net ton of Pennsylvania anthracite, exclusive of dredge coal, shipped to points outside and inside producing region in 1960, by regions and sizes

(Value does not include margins of separately incorporated sales companies)

Size	Lehigh region			Schuylkill region		
	Shipped outside region	Local sales	Total	Shipped outside region	Local sales	Total
Lump [1] and Broken				$10.53	$11.57	$10.62
Egg	$10.25	$9.77	$10.23	10.22	10.46	10.23
Stove	10.55	11.41	10.59	10.33	10.64	10.39
Chestnut	10.74	13.06	10.98	10.51	10.67	10.56
Pea	8.83	11.78	9.44	8.41	8.93	8.59
Total Pea and larger	10.18	12.19	10.41	9.94	10.08	9.97
Buckwheat No. 1	8.33	10.69	8.75	8.05	8.36	8.14
Buckwheat No. 2 (Rice)	8.36	10.85	9.29	7.89	8.18	7.99
Buckwheat No. 3 (Barley)	7.14	8.23	7.25	6.89	6.28	6.76
Buckwheat No. 4	5.05		5.05	4.85	5.04	4.88
Buckwheat No. 5	4.93	4.75	4.89	4.29	4.01	4.23
Other	2.33	1.58	1.77	3.68	2.28	2.90
Total Buckwheat No. 1 and smaller	6.30	4.75	5.82	6.17	5.56	6.00
Total all sizes	8.05	6.13	7.60	7.61	7.24	7.50

Size	Wyoming region [2]			Total		
Lump [1] and Broken	$11.20		$11.20	$10.83	$11.57	$10.87
Egg	10.40	$11.22	10.42	10.30	10.49	10.31
Stove	10.68	12.01	10.74	10.52	10.88	10.56
Chestnut	10.90	12.97	11.23	10.72	11.54	10.89
Pea	9.49	11.76	10.64	8.85	10.69	9.57
Total Pea and larger	10.56	12.12	10.90	10.23	11.03	10.42
Buckwheat No. 1	8.04	10.63	8.92	8.09	9.67	8.54
Buckwheat No. 2 (Rice)	8.64	9.92	9.09	8.21	9.20	8.56
Buckwheat No. 3 (Barley)	7.13	7.33	7.16	7.01	6.69	6.95
Buckwheat No. 4	5.18	5.45	5.19	4.95	5.05	4.95
Buckwheat No. 5	4.85	4.54	4.78	4.49	4.22	4.43
Other	4.39	1.82	2.54	3.63	1.93	2.52
Total Buckwheat No. 1 and smaller	7.18	6.66	7.00	6.48	5.80	6.27
Total all sizes	9.00	8.74	8.92	8.15	7.64	8.01

[1] Quantity of Lump included is insignificant.
[2] Includes Sullivan County.

TABLE 30.—Average value per net ton of Pennsylvania anthracite from all sources, by regions[1]

Region	1959				1960			
	Shipped outside region	Local sales	Colliery fuel	Total production	Shipped outside region	Local sales	Colliery fuel	Total production
Lehigh	$8.75	$6.40	$7.60	$8.27	$8.02	$6.13	$8.29	$7.58
Schuylkill	7.80	6.74	7.51	7.53	7.20	7.18	7.43	7.19
Wyoming[2]	9.48	10.23	5.63	9.59	9.00	8.74	5.63	8.88
Total	8.53	7.80	5.97	8.35	7.91	7.60	5.96	7.82

[1] Value given for shipments is value at which coal left possession of producing company and does not include margins of separately incorporated sales companies.
[2] Includes Sullivan County.

EMPLOYMENT

The 18-percent decline in the labor force at anthracite operations in 1960 continued the downtrend which has persisted since 1947. Employment, as measured by the average number of men working daily, totaled 19,051, compared with 23,294 in 1959. The greater proportional decline in employment than in production resulted primarily from the sharply lowered activity at deep mines, which have higher manpower requirements.

In 1960, 46 percent of the industry's total working force was in the Schuylkill region, 38 percent in the Wyoming, and 16 percent in the Lehigh, as indicated in table 31. Employment declined in each of the regions, with the largest decrease occurring in the Wyoming region, 25 percent below 1959.

Schuylkill, Luzerne, Northumberland, and Lackawanna, in order, were the leading counties in the number of men working daily at anthracite operations, as shown in table 32. The combined working force of these counties comprised 93 percent of the industry's total. Employment declined from 1959 in each of the ranking counties; the largest decrease, 30 percent occurred in Luzerne County.

TABLE 31.—Men employed, days worked, man-days of labor and output per man per day at operations producing Pennsylvania anthracite in 1960

(Includes operations of strip contractors)

	Lehigh region	Schuylkill region	Wyoming region [1]	Total	
				1960	1959
Average number of men working daily:					
Underground	935	3,875	4,231	9,041	11,900
In strip pits	977	1,692	801	3,470	3,775
At culm banks	151	261	173	585	769
At preparation plant	676	1,689	780	3,145	3,412
Other surface	263	1,099	1,320	2,682	3,275
Total excluding dredge operations	3,002	8,616	7,305	18,923	23,131
Dredge operations	14	114	----	128	163
Total average number of men working daily	3,016	8,730	7,305	19,051	23,294
Average number of days active:					
All operations except dredges	132	179	190	176	173
Dredge operations	144	219	----	211	191
Average days active, all operations	132	180	190	176	173
Man-days of labor:					
All operations except dredges	396,638	1,545,279	1,391,564	3,333,481	4,004,511
Dredge operations	2,020	24,954	----	26,974	31,063
Total man-days, all operations	398,658	1,570,233	1,391,564	3,360,455	4,035,574
Average tons per man per day:					
All operations except dredges	6.96	5.82	4.56	5.43	4.98
Dredge operations	11.24	27.63	----	26.40	23.07
Average tons per man day, all operations	6.98	6.17	4.56	5.60	5.12

[1] Includes Sullivan County.

TABLE 32.—Men employed at operations producing Pennsylvania anthracite, by counties

(Includes operations of strip contractors)

County	1959	1960	County	1959	1960
Carbon	287	312	Luzerne	8,117	5,713
Columbia	789	637	Northumberland	2,730	2,600
Dauphin	212	194	Schuylkill	8,264	6,992
Lackawanna	2,758	2,496	Sullivan	25	21
Lancaster, Lebanon, Northampton, and Snyder [1]	108	79	Susquehanna and Wayne [2]	4	7
			Total	23,294	19,051

[1] Counties producing dredge coal only.
[2] None employed in Susquehanna in 1959.

Industry employment was divided as follows: 47 percent in underground workings, 18 percent in strip mines, 17 percent in preparation plants, 14 percent in surface work at underground mines (including general shops), 3 percent at culm banks, and 1 percent at

dredges. The total number of men working at deep mines (underground plus associated surface workers and general shops) was 11,723, a 23-percent decrease from the corresponding total of 15,175 men in 1959. At strip mines, the decline of 8 percent in employment was less severe.

The reduced labor force worked an average of 176 days in 1960, or 3 more than 1959. Actual worktime in the industry totaled 3,360,455 man-days, a 17-percent decline from 1959. Mining activity was highest in the Wyoming and Schuylkill regions, with respective averages of 190 and 180 days, and lowest in the Lehigh region, with 132 days. The relatively low activity in the Lehigh region resulted from the closing of the operations of a large company early in 1960. Other operations in the Lehigh region averaged 179 days.

The productivity rate in the anthracite industry rose to a new high of 5.60 tons per man-day, 9 percent above the former record of 5.12 in 1959. The gain in 1960 reflected the decreased proportion of total production originating from deep mines and the increased proportion from strip mines and culm banks, which have appreciably higher productivity rates. Output per man-day was 6.98 tons in the Lehigh region, 6.17 in the Schuylkill, and 4.56 tons in the Wyoming. The regional variations reflect primarily the different proportions of deep, strip, culm-bank, and dredge coal produced in each area.

DISTRIBUTION

According to reports filed with the Bureau of Mines, shipments of Pennsylvania anthracite totaled 18,813,000 net tons for the 1959–60 coal year (April 1–March 31), a decrease of 7 percent from the prior year. Of the total, approximately 92 percent was shipped to destinations inside the United States, 7 percent to Canada, and only 1 percent to other countries. Compared with the 1958–59 coal year, shipments declined 5 percent in the United States, 8 percent in Canadian markets, and 62 percent in exports overseas. A breakdown of shipments in the 1959–60 coal year, by sizes and by States and Provinces of destination, is presented in table 33.

The adverse effect of competition from other fuels in American spaceheating markets was again evident, as shipments of the hand-fired sizes (Pea and larger) fell 10 percent below the 1958–59 coal year tonnage. The sizes burned in automatic space-heating equipment fared somewhat better, since the movement of Buckwheat No. 1 declined only 6 percent and Buckwheat Nos. 2 (Rice) and 3 (Barley) dropped about 4 percent each. After a rather abrupt decline during the 1958–59 coal year, because of depressed economic conditions, the industrial sizes (Buckwheat No. 4 and smaller) registered a moderate recovery, gaining 4 percent.

TABLE 33.—Distribution of Pennsylvania anthracite, April 1, 1959, to March 31, 1960, by States, Provinces, and countries of destination, in net tons

Destination	Pea and larger						Buckwheat No. 1 and smaller					Total all sizes	Percent of total
	Broken	Egg	Stove	Chestnut	Pea	Total	Buckwheat No. 1	Buckwheat No. 2 (Rice)	Buckwheat No. 3 (Barley)	All other sizes	Total		
United States:													
New England States:													
Connecticut	----	1,219	48,969	57,571	4,116	111,875	9,116	14,778	20,152	402	44,448	156,323	.83
Maine	----	1,953	39,635	33,409	693	75,690	5,860	11,625	4	20	17,509	93,199	.49
Massachusetts	821	21,723	234,780	112,487	15,250	385,061	39,058	44,291	23,470	372	107,191	492,252	2.62
New Hampshire	----	1,467	26,741	17,229	1,496	46,933	5,952	10,442	----	50	16,444	63,377	.34
Rhode Island	----	916	15,964	11,418	850	29,148	5,148	3,069	----	108	8,325	37,473	.20
Vermont	----	1,221	35,821	23,430	3,918	64,390	16,332	20,728	47	----	37,107	101,497	.54
Total	821	28,499	401,910	255,544	26,323	713,097	81,466	104,933	43,673	952	231,024	944,121	5.02
Middle Atlantic States:													
New Jersey	1,155	9,941	228,146	523,525	175,141	937,908	189,632	177,824	403,504	242,826	1,013,786	1,951,694	10.38
New York	687	52,917	708,263	688,673	696,116	2,146,656	734,916	332,783	427,227	354,746	1,849,672	3,996,328	21.24
Pennsylvania [1]	12,083	23,386	600,100	1,339,391	1,232,451	3,207,411	1,199,606	1,046,784	1,439,377	1,971,745	5,657,512	8,864,923	47.12
Total	13,925	86,244	1,536,509	2,551,589	2,103,708	6,291,975	2,124,154	1,557,391	2,270,108	2,569,317	8,520,970	14,812,945	78.74
South Atlantic States: [2]													
Delaware	3,593	515	15,090	44,799	4,254	68,251	1,088	839	20,692	128	22,747	90,998	.48
District of Columbia	----	939	13,394	13,136	1,684	29,153	8,631	915	717	----	10,263	39,416	.21
Maryland	----	1,170	67,331	62,893	5,764	137,158	32,967	6,070	299	205,871	245,207	382,365	2.03
Virginia	----	195	8,763	8,926	396	18,280	882	526	----	298	1,706	19,986	.11
Total	3,593	2,819	104,578	129,754	12,098	252,842	43,568	8,350	21,708	206,297	279,923	532,765	2.83
Lake States: [3]													
Illinois	5	184	4,413	7,636	514	12,752	61,538	4,428	2,455	15,752	84,173	96,925	.52
Michigan	----	361	10,295	5,636	480	16,772	3,100	12,882	19	102,115	118,116	134,888	.72
Minnesota	----	25	715	1,432	104	2,276	1	1	2	20,851	20,855	23,131	.12
Ohio	----	1,713	2,698	3,241	5,232	12,884	21,196	3,537	10,599	206,208	241,540	254,424	1.35
Wisconsin	----	152	26,535	33,792	2,830	63,309	6,838	3,057	1	52,578	62,474	125,783	.67
Total	5	2,435	44,656	51,737	9,160	107,993	92,673	23,905	13,076	397,504	527,158	635,151	3.38
All other States	329	3,383	2,851	10,248	131	16,942	48,506	12,121	19,506	179,623	259,756	276,698	1.47
Total United States	18,673	123,380	2,090,504	2,998,872	2,151,420	7,382,849	2,390,367	1,706,700	2,368,071	3,353,693	9,818,831	17,201,680	91.44

Canada:													
Ontario	47	6,032	442,821	322,388	90,576	861,864	38,470	27,279	5,306	3,844	74,899	936,763	4.98
Quebec	-------	2,468	92,856	49,477	4,094	148,895	84,235	50,038	48,269	98,785	281,327	430,222	2.29
Other Provinces	223	2,695	6,923	4,970	----------	14,811	94	409	50	106	659	15,470	.08
Total Canada	270	11,195	542,600	376,835	94,670	1,025,570	122,799	77,726	53,625	102,735	356,885	1,382,455	7.35
Other countries	179	-------	171	1,383	30,137	31,870	61,803	1,469	2,495	131,027	196,794	228,664	1.21
Grand total	19,122	134,575	2,633,275	3,377,090	2,276,227	8,440,289	2,574,969	1,785,895	2,424,191	3,587,455	10,372,510	18,812,799	100.00

[1] Includes "Local Sales."
[2] Shipments to other states generally referred to as being in the South Atlantic area are included in "All other States."
[3] Shipments to Indiana are included in "All other States."

The Canadian market displayed trends similar to those in the United States, although differing in degree. For example, exports of Pea and larger sizes to Canada fell 15 percent below the 1958–59 level, compared with the 10-percent decline in shipments of these sizes in the United States, whereas Buckwheat No. 1 fell 13 percent, and Rice, 7 percent. As in the United States, the Canadian market took more of the smaller sizes; exports of Barley gained 11 percent, and Buckwheat No. 4 and smaller more than tripled. Most of the exports to other countries consisted of Pea, Buckwheat No. 1, and Buckwheat No. 4 and smaller; these accounted for approximately 223,000 tons of the total.

Among United States markets, the "all other States" category showed the largest gain over the 1958–59 coal year, 25 percent, followed by the Lake States with 19 percent, and Pennsylvania with 4 percent. Losses ranged from 22 percent in the South Atlantic States to 19 percent in New Jersey, 18 percent in New England, and 14 percent in New York. The gains in the areas mentioned were due almost entirely to increased receipts of the Buckwheat sizes, particularly Buckwheat No. 4 and smaller, but in areas showing declines, the market losses were about equally divided between Pea and larger and the Buckwheat sizes. Although truck shipments during the 1959–60 coal year were slightly less than in 1958–59, the proportion trucked to final destinations reached 41 percent of total shipments, a record high.

The transportation trends shown in the Bureau's distribution statistics for the 1959–60 coal year continued throughout calendar year 1960, according to monthly data published by the Pennsylvania Department of Mines and Mineral Industries. Rail shipments were 14 percent less than in 1959, but truck traffic declined less than 1 percent, or about 4,000 tons. (See tables 34 to 36.) According to these data, each of the major anthracite-consuming States took less

TABLE 34.—Rail shipments of Pennsylvania anthracite, by destinations, in net tons[1]

[Pennsylvania Department of Mines and Mineral Industries]

Destination	1957	1958	1959	1960
New England States	1,287,632	1,032,680	932,593	712,780
New York	3,723,217	2,995,230	2,728,926	2,458,043
New Jersey	1,927,658	1,534,953	1,178,965	988,852
Pennsylvania	4,622,699	2,814,258	2,449,545	2,236,964
Delaware	86,231	69,816	57,597	48,586
Maryland	293,316	268,054	185,073	167,355
District of Columbia	39,244	39,901	43,664	22,024
Virginia	28,207	32,378	19,262	17,524
Ohio	251,585	148,711	260,278	165,903
Indiana	24,427	35,540	53,785	44,763
Illinois	133,817	81,090	99,826	91,640
Wisconsin	103,155	83,921	72,346	60,737
Minnesota	89,023	10,011	10,740	13,032
Michigan	52,718	30,723	28,815	50,835
Other States	165,434	100,560	160,260	154,586
Total United States	12,828,363	9,277,826	8,281,675	7,233,624
Canada	1,588,304	1,304,214	1,311,841	1,067,181
Other foreign countries	1,663,819	459,129	187,883	68,875
Grand total	16,080,486	11,041,169	9,781,399	8,369,680

[1] Does not include dredge coal.

rail-shipped anthracite than in 1959; there was a drop of about 50 percent in rail shipments to the District of Columbia, 24 percent to New England, 10 percent to New York, and 9 percent to Pennsylvania points. Truck data from the same source demonstrate the relative stability of the trucking market in 1959–60, small declines in the "local sales" area, New York, and New Jersey being offset by increased shipments to Pennsylvania points outside the producing region.

After making marked gains in 1959, the Lake trade in Pennsylvania anthracite declined abruptly in 1960. Lake Erie loadings totaled only 244,000 tons, a drop of 26 percent from the 329,000 loaded over these docks in 1959, whereas loadings over Lake Ontario docks

TABLE 35.—Truck shipments of Pennsylvania anthracite, by destinations, in net tons

[Pennsylvania Department of Mines and Mineral Industries]

Destination	1957	1958	1959	1960
Pennsylvania:				
Within region	4,396,417	4,306,015	3,904,608	3,826,445
Outside region	2,006,029	2,624,608	2,704,972	2,900,414
New York	1,170,358	1,239,218	1,279,693	1,217,342
New Jersey	681,992	714,060	619,926	548,678
Delaware	33,452	42,169	44,748	48,221
Maryland	65,298	103,899	98,118	103,381
District of Columbia	2,800	4,174	6,639	6,232
Other States	9,574	15,116	13,669	17,703
Total	8,365,920	9,049,259	8,672,373	8,668,416

TABLE 36.—Truck shipments of Pennsylvania anthracite in 1960, by months and by States of destination, in net tons [1]

Destination	January	February	March	April	May	June	July
Pennsylvania:							
Within region	443,751	406,657	447,884	279,395	243,571	271,811	187,964
Outside region	290,293	280,149	305,061	172,128	193,695	201,744	156,208
New York	128,933	115,052	128,472	77,249	64,022	78,925	72,079
New Jersey	56,156	51,247	68,143	30,708	29,766	40,912	32,019
Delaware	6,273	7,118	7,163	1,717	940	1,969	3,230
Maryland	13,138	12,170	15,719	3,908	1,723	3,656	2,930
District of Columbia	681	1,930	1,581	44	85		28
Other States	2,729	1,576	1,982	557	265	783	791
Total: 1960	941,954	875,899	976,005	565,706	534,067	599,800	455,249
1959	1,087,940	754,268	695,240	661,762	566,893	631,142	467,882

Destination	August	September	October	November	December	Total	Percentage of total trucked
Pennsylvania:							
Within region	226,815	229,131	308,318	327,040	454,108	3,826,445	44.1
Outside region	277,676	235,235	243,489	238,475	306,261	2,900,414	33.5
New York	98,655	102,390	120,071	110,156	121,338	1,217,342	14.0
New Jersey	44,615	40,225	45,742	44,494	64,651	548,678	6.3
Delaware	2,352	1,929	3,366	4,640	7,524	48,221	.6
Maryland	5,586	8,688	11,479	10,141	14,243	103,381	1.2
District of Columbia	87	153	540	350	753	6,232	.1
Other States	1,203	1,029	2,877	1,125	2,786	17,703	.2
Total: 1960	656,989	618,780	735,882	736,421	971,664	8,668,416	100.0
1959	617,311	765,255	731,221	785,802	907,657	8,672,373	100.0

[1] Compiled from reports of Pennsylvania Department of Mines and Mineral Industries; does not include dredge coal.

doubled the 1959 figure of 24,000 tons. The Upper Lake trade continued to decline as receipts fell 16 percent at Duluth-Superior and 16 and 2 percent, respectively at docks on Lakes Superior and Michigan. Reloadings for inland delivery declined 23 percent at both Lake Superior and Lake Michigan docks. Detailed monthly data on several aspects of the Lake trade in Pennsylvania anthracite are shown in table 2.

According to data issued by the Massachusetts Division on the Necessaries of Life, the decline in anthracite shipments to New England continued unchecked in 1960. Total rail receipts were only 697,000 tons, compared with 867,000 tons in 1959. As 1.3 million tons was rail-shipped to New England destinations in 1957, almost one-half of the rail tonnage has been lost in 3 years. No tidewater receipts were reported for 1960. Tables 2 and 37 present data on New England receipts of Pennsylvania anthracite.

TABLE 37.—Receipts of anthracite in New England
(Thousand net tons)

Year	Receipts by tidewater	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]	Year	Receipts by tidewater [4]	Receipts by rail [1]	Imports [2]	Total receipts of Pennsylvania anthracite [3]
1917	[1] 4,421	7,259	1	11,679	1951	66	3,135	27	3,174
1920	[1] 3,521	7,804	1	11,324	1952	70	2,847	29	2,888
1923	[1] 4,082	8,102	145	12,039	1953	49	2,088	31	2,106
1927	[1] 2,421	6,725	106	9,040	1954	10	1,893	6	1,897
1945	[4] 331	4,750	[5]	5,081	1955	5	1,713	[5]	1,718
1946	[4] 399	5,244	----------	5,643	1956	10	1,610	[5]	1,620
1947	[4] 240	4,498	----------	4,738	1957	3	1,262	----------	1,265
1948	[4] 217	4,646	----------	4,863	1958	3	1,009	----------	1,012
1949	[4] 110	3,336	----------	3,446	1959	2	867	[5]	869
1950	[4] 81	3,615	18	3,678	1960	----------	698	[5]	698

[1] Commonwealth of Massachusetts, Division on the Necessaries of Life.
[2] U.S. Department of Commerce.
[3] Total receipts by rail and by tidewater less imports.
[4] Association of American Railroads.
[5] Less than 500 tons.

CONSUMPTION

Apparent consumption (production, plus imports, minus exports, plus or minus changes in producers' stocks) of Pennsylvania anthracite totaled 17.6 million tons in 1960, a decline of 6 percent. Although shipments of all sizes except Buckwheat No. 5 decreased, the decline of 1.2 million tons, or 17 percent, in the movement of Pea and larger sizes to markets outside the producing region accounted for most of the decline. This sharp drop in demand for the larger sizes undoubtedly reflected the continued competitive pressures of other fuels in space-heating markets. This conclusion is shown by the 14-percent decline in outside-region shipments of Buckwheat Nos. 1, 2 (Rice), and 3 (Barley), large tonnages of which are burned in automatic equipment for domestic and commercial space-heating.

Weather conditions were an important factor. According to the Anthracite Institute, the 1960 heating season was colder than 1959 and normal. However, this was due almost entirely to extreme cold in March and December. The effect of cold weather in these two months was minimal, perhaps, because in March consumers probably limited purchases in an effort to deplete their stocks, while the extreme cold in December came too late to be reflected fully in the year's production and distribution data.

Demand for the industrial sizes (Buckwheat No. 4 and smaller) remained firm in markets outside the region despite depressed business conditions. Shipments of these sizes fell less than 2 percent, or 50,000 tons, below the 1959 level. In the producing region, or "local sales" area, both the Pea and larger and Buckwheat No. 1 and smaller size categories registered moderate gains.

Since producers reduced stocks in ground storage by 230,000 tons, 1960 production did not equal total domestic and foreign demand. Likewise, because of stock liquidations elsewhere, the figure for apparent consumption (17.6 million tons) is not a true measure of total consumption in 1960. For example, according to estimates of the Bureau of Mines, retail dealers located outside the producing region delivered 6,775,000 tons of Pennsylvania anthracite to consumers in 1960, a drop of 10 percent. However, these same dealers reduced inventories by 305,000 tons during the year, while public utilities took about 220,000 tons of their requirements from stockpiles. Although the quantity of anthracite used in making coke was about the same as in 1959 (370,000 tons), coke plants also drew upon stockpiles, reducing stocks by 16,000 tons.

The last report to be issued by the Association of American Railroads on consumption and stocks of anthracite showed a further continuation of the decline in consumption by Class I railroads. In 1960 these roads consumed 248,000 tons, compared with 292,000 tons in 1959. Consumption of anthracite also declined in the cement industry from 159,000 tons in 1959 to 152,000 in 1960. According to the American Iron and Steel Institute, consumption of anthracite by these industries varied little between 1959 and 1960. For instance, the tonnage used in sintering and pelletizing iron ores dropped from 780,000 to 754,000 tons, but this decline was offset by the rise from 683,000 to 720,000 tons in the quantity used for steam raising, gas making, and other purposes. Consumption moved upward at public utility plants, the year's burn of 2,751,000 tons representing a gain of about 5 percent, according to the Federal Power Commission.

Monthly data on consumption of anthracite by public utilities and railroads are shown in table 2. Table 38 presents data on the consumption of anthracite, briquets, domestic coke, heating and range oils, and natural gas in those States comprising the anthracite industry's primary marketing area. Retail deliveries and consumption data for selected industrial consumers will be found in table 39.

TABLE 38.—Apparent consumption of anthracite and selected competitive fuels in the principal anthracite markets

(Thousand net tons)

Fuel	New England	New York	New Jersey	Pennsylvania	Delaware	Maryland	District of Columbia	Total	Percent of total fuels
Anthracite (all users) [1]									
1957	1,288	[2] 4,893	[2] 2,610	11,025	120	358	42	20,336	17.3
1958	1,033	[2] 4,234	[2] 2,249	9,745	112	372	44	17,789	13.3
1959	933	[2] 4,009	[2] 1,799	9,059	102	283	50	16,235	12.3
1960	713	[2] 3,675	[2] 1,537	8,964	97	271	28	15,285	11.2
Imported: [3]									
1957									
1958									
1959		(4)						(4)	(5)
1960	(4)	(4)						(4)	(5)
Briquets (domestic use):									
1957	12	4	1	7	(4)	5	1	30	(5)
1958	9	3	1	7	(4)	5	1	26	(5)
1959	(4)	(4)		1		1		2	(5)
1960	1			(4)		1		2	(5)
Coke (domestic use):									
1957	221	58	162	57	(4)	(4)		498	.4
1958	201	53	146	50	(4)	1		451	.4
1959	162	37	116	34	(4)			349	.3
1960	128	30	98	29	(4)			285	.2
Imported: [3]									
1957	(4)	12						12	(5)
1958		13						13	(5)
1959	(4)	15						15	(5)
1960	(4)	1						1	(5)
Oil (heating and range) [6]									
1957	24,807	19,820	10,112	9,090	903	4,559	1,287	70,578	60.0
1958	30,289	26,850	10,464	10,553	1,293	4,793	1,309	85,551	63.9
1959 [7]	29,066	27,037	10,896	10,543	1,055	3,824	1,155	83,576	63.6
1960	31,008	27,714	11,201	11,510	991	4,135	1,200	87,759	64.0
Natural gas: [8]									
1957	2,455	9,095	2,544	9,872	(9)	(9)	[9] 2,328	26,294	22.3
1958	3,096	10,227	3,103	10,939	(9)	(9)	[9] 2,649	30,014	22.4
1959	3,201	11,017	3,160	11,256	(9)	(9)	[9] 2,701	31,338	23.8
1960	3,516	11,890	3,532	11,913	181	(9)	[9] 2,738	33,770	24.6
Total:									
1957	28,783	33,882	15,429	30,051	[10] 1,023	[10] 4,922	[10] 3,658	117,748	100.0
1958	34,628	41,380	15,963	31,294	[10] 1,405	[10] 5,171	[10] 4,003	133,844	100.0
1959	33,365	42,115	15,971	30,893	[10] 1,157	[10] 4,108	[10] 3,906	131,515	100.0
1960	35,366	43,310	16,368	32,416	[10] 1,269	[10] 4,407	[10] 3,966	137,102	100.0

[1] Pennsylvania Department of Mines and Mineral Industries.
[2] An important but undetermined part of anthracite shown as shipped to New Jersey is reshipped to New York City.
[3] U.S. Department of Commerce.
[4] Less than 500 tons.
[5] Less than 0.05 percent.
[6] Converted to coal equivalent upon basis of 4 barrels of fuel oil equaling 1 ton of coal.
[7] Revised.
[8] Converted to coal equivalent upon basis of 24,190 cubic feet of natural gas equaling 1 ton of coal.
[9] 1957–59 Delaware and Maryland included with District of Columbia; 1960 Maryland included with District of Columbia.
[10] 1957–59 natural gas for Delaware and Maryland included with District of Columbia; 1960 Maryland included with District of Columbia.

Mechanical Stokers.—Factory sales of anthracite stokers showed a marked decline in 1960. According to the Bureau of the Census, U.S. Department of Commerce, sales of Class I residential stokers (capacity under 61 pounds of coal per hour) totaled 7,050 units, 17 percent less than the 8,484 units shipped in 1959. Sales of Class 2 stokers (small commercial types with a capacity between 61 and 100 pounds of coal per hour) dropped 29 percent, from 267 units in 1959 to 189 units in 1960.

TABLE 39.—Retail dealer deliveries and consumption of Pennsylvania anthracite in the United States, by selected consumer categories

(Thousand net tons)

Year	Retail dealer deliveries [1]	Used as colliery fuel	Used by railroads [2]	Used for generating electricity [3]	Used in the manufacture of briquets	Used at cement plants	Used in the iron and steel industry		
							For coke making	For sintering and pelletizing [4]	Other uses [5]
1955	13,019	419	457	3,209	264	199	366	385	443
1956	13,018	342	409	3,296	228	244	377	564	625
1957	10,670	279	361	3,363	156	221	389	868	698
1958	9,386	195	335	2,786	120	183	255	685	686
1959	7,562	129	292	2,629	43	159	369	780	683
1960	6,775	102	248	2,751	31	152	370	754	720

[1] Estimated from reports submitted by a selected list of retail dealers. Does not include local sales.
[2] Association of American Railroads.
[3] Federal Power Commission.
[4] Annual Statistical Report, American Iron and Steel Institute.
[5] Annual Statistical Report, American Iron and Steel Institute. Contains a small but undetermined amount of anthracite used for sintering.

STOCKS

Anthracite producers maintained stocks at a relatively low level throughout 1960. The largest amount reported held in ground storage at the mines was the 378,000 tons at the close of January, a figure approximately equal to the monthly average in 1959. The most abrupt decline occurred between November and December, as stocks fell to 199,000 tons by the end of the year, the lowest yearend figure recorded since data on producers' stocks were first published. Although the inventory position of most producers apparently was adequate for the first 11 months of the year, the unusually heavy snows and severe cold which gripped the Middle Atlantic and New England States during much of December caused some shippers to fall 2 to 3 weeks behind on shipments of certain sizes, despite the drawdown in stocks.

At the close of December, stocks in retail yards located outside the anthracite producing region were estimated by the Bureau of Mines at 729,000 tons, a decrease of approximately 30 percent from December 1959. Although this low closing figure was attributable in part to the heavy December demand, the 1960 monthly data on stocks held in retail yards showed a further continuation of the tendency among retailers to operate with lower inventories than in prior years.

Public utilities also continued in 1960 to reduce the quantity of anthracite held in reserve, as the total reported for December (1,799,000 tons) was 11 percent less than at the end of 1959. By meeting approximately 8 percent of their total anthracite requirements by stock withdrawals, the public-utility industry, as in 1959, obviously either decreased purchases or production from privately owned sources.

The Association of American Railroads announced that no data would be collected after 1960 on coal stocks and consumption. According to this source, stocks of anthracite held by Class I railroads at the end of December 1960 totaled only 30,000 tons, down 6 percent from 1959.

Apparently the decreased movement of anthracite over the Great Lakes was sufficient to meet 1960 demands since inventories at docks on Lake Michigan and Lake Superior changed only moderately, the former increasing less than 1,000 tons and the latter decreasing a like amount. At coke plants, the 93,000 tons reported on hand at the end of 1960 represented a decline of 15 percent from 1959.

FOREIGN TRADE [4]

Exports of Pennsylvania anthracite totaled slightly more than 1.4 million net tons in 1960, a decline of 20 percent from 1959, according to data released by the Bureau of the Census, U.S. Department of Commerce. Most of the decline was attributable to substantial losses in Canada, France, Israel, and Cuba, the latter as a result of the Cuban government's seizure of the U.S.-owned Nicaro nickel plant.

Exports to Canada declined about 259,000 net tons (18 percent), reaching the lowest level since 1933. The Canadian market has declined erratically, but steadily, since 1952 owing to increased competition from both indigenous and imported liquid and gaseous fuels. The completion of the trans-Canada pipeline system during 1957–58 and the subsequent rise in natural gas production, notably in the Province of Alberta, triggered the spectacular increase in natural-gas consumption. According to the Department of Mines and Technical Surveys, Ottawa, total net sales of natural gas in Canada rose from about 144 billion cubic feet in 1956 to about 282 billion feet in 1959. Intermediate totals of 169 billion and 207 billion cubic feet were attained in 1957 and 1958, respectively. Between 1958 and 1959, sales increased by 28.5 billion feet in the Province of Ontario and by 22.2 billion in Alberta. Although sales data are not available for 1960, the rise in production from approximately 417 billion cubic feet in 1959 to an estimated 504 billion feet in 1960 clearly indicates a continuation of the upward trend in consumption.

Data are not available on Canadian sales and imports of heating oils in 1960; however, as reported by the Dominion Bureau of Statistics, sales of Nos. 2 and 3 heating oils in Ontario and Quebec, which together take almost all of the anthracite imported annually, rose from 29.5 million barrels in 1955 to 44.2 million barrels in 1959. A possible extension of this trend is indicated by preliminary estimates which placed Canadian crude-oil production in 1960 in excess of 192 million barrels, as compared with about 185 million in 1959.

In Europe, the abrupt decline in shipments to France and Trieste was nearly balanced by increased exports to the Netherlands, Belgium-

[4] Figures on imports and exports compiled by Mae B. Price and Elsie D. Jackson, Division of Foreign Activities, Bureau of Mines, from records of the Bureau of the Census.

Luxembourg, and Italy. Despite the low 1960 volume, prospects for increased trade with Europe in 1960 were brightened by the sailing on November 15 of the British vessel *Overseas Courier* from Philadelphia, Pa., for Rotterdam, Holland, with the largest single cargo ever shipped overseas. The 29,063 tons of fine sizes aboard (included in the total for the Netherlands) presumably were for use by the West German iron and steel industry in processing iron ore. Exports to all other countries totaled only about 33,000 tons, almost all of which went to Brazil and Viet Nam.

Only 1,476 tons of anthracite was imported into the United States in 1960, according to the Bureau of the Census. Imports are shown for 1959–60 in table 40, and exports by country of destination and custom districts are shown in table 41.

Based on preliminary data published in the Accounts Relating to the Trade and Navigation of the United Kingdom, the British export trade in anthracite staged a moderate recovery after rather severe setbacks in 1958 and 1959. According to this source, exports totaled 907,000 metric tons, compared with 825,000 tons in 1959 and 1,135,000 tons in 1958. No data are yet available on British exports by country of destination; however, as the Dominion Bureau of Statistics reported a decline of approximately 32,000 tons in 1960 Canadian imports of Welsh anthracite, most of the recovery apparently occurred in Britain's traditional European anthracite markets.

Japan, one of the world's largest importers of anthracite, materially increased purchases of this fuel in 1960. Statistics released in the Annual Return on the Foreign Trade of Japan show that imports of anthracite totaled 827,000 metric tons for the year, compared with about 519,000 tons in 1959. Principal suppliers were North Viet-Nam, 473,000 metric tons (up 122,000 tons from 1959); Republic of Korea, 126,000 tons (up 66,000 tons); Canada, 118,000 tons (up 57,000 tons); and the U.S.S.R., 55,000 tons (up 34,000 tons). The Japanese also obtained about 18,000 tons from the Union of South Africa, 21,000 tons from India, and smaller quantities from Taiwan, South Viet-Nam, and the United States. However, the Bureau of the Census did not report any exports of anthracite to Japan in 1960.

TABLE 40.—Anthracite imported for consumption in the United States, 1959–60, by countries and customs districts

(Net tons)

Country	1959	1960	Customs district	1959	1960
Canada	2,538	1,476	Buffalo	--	41
Korea, Republic of	88	--	Maine and New Hampshire	--	336
United Kingdom	7	--	New York	88	--
			St. Lawrence	7	--
Total	2,633	1,476	Washington	2,538	1,099
			Total	2,633	1,476

Source: Bureau of the Census.

TABLE 41.—Anthracite exported from the United States, by countries and customs districts

(Net tons)

Country	1959	1960
North America:		
Canada	1,453,228	1,194,170
Costa Rica	100	
Cuba	89,681	25,315
Dominican Republic	35	
Mexico	1,488	1,879
Trinidad and Tobago	56	
Total	1,544,588	1,221,364
South America:		
Argentina	3,099	16
Brazil	8,818	18,175
Paraguay		6
Uruguay		497
Venezuela	5	29
Total	11,922	18,723
Europe:		
Belgium-Luxembourg		10,328
France	117,519	62,362
Italy	48,243	53,180
Netherlands	18,114	51,830
Sweden	15	
Trieste	10,712	
Total	194,603	177,700
Asia:		
India	1,715	1,068
Indonesia		31
Israel	23,032	20
Nansei and Nanpo Islands	37	
Philippines		29
Saudi Arabia		6
Vietnam	11,661	11,169
Total	36,445	12,323
Oceania: Australia		46
Grand total	1,787,558	1,430,156

Customs district	1959	1960
North Atlantic:		
Maine and New Hampshire	16	85
New York	17,576	1,878
Philadelphia	441,432	353,048
South Atlantic: Virginia	3,209	1,042
Gulf Coast:		
Mobile	35	
Sabine	1,693	1,068
Mexican border:		
El Paso		108
Laredo	1,218	1,732
Northern border:		
Buffalo	840,880	714,799
Dakota		31
Duluth and Superior	2,003	2,508
Michigan	905	347
Ohio	12,822	5,920
Rochester	20,282	18,866
St. Lawrence	429,687	322,564
Vermont	14,560	6,160
Miscellaneous [1]	1,240	
Total	1,787,558	1,430,156

[1] District breakdown not available.

Source: Bureau of the Census

WORLD PRODUCTION

World production of anthracite remained virtually unchanged in 1960, the year's total representing a gain of slightly more than 1 percent over the revised figure of 187.1 million tons for 1959. In Europe, France, West Germany, Netherlands, and the United Kingdom produced almost exactly the same tonnage as in 1959, whereas Belgian output continued the decline that started in 1958. Estimates placed production in the U.S.S.R. at the 1959 level. China continued to increase anthracite production, recording a gain of 13 percent over 1959; the Republic of Korea also made a substantial gain in output with the assistance of the United States. Output in North Vietnam rose approximately 46 percent over 1959, apparently as the result of increased trade with other Asiatic countries, particularly Japan. Statistics on world production, by countries, 1956–60, are shown in table 42.

TABLE 42.—World production of anthracite by countries[1]

(Thousand short tons)

Country	1956	1957	1958	1959	1960
Belgium	7,675	9,827	7,541	7,059	6,488
Bulgaria	137	[2] 150	[2] 165	[2] 165	[2] 165
China [2]	5,500	5,700	11,000	22,000	24,800
France	12,466	13,356	12,236	12,125	12,125
Germany:					
East [2]	275	275	275	275	275
West	13,453	13,338	[2] 13,800	[2] 13,200	[2] 13,200
Ireland	182	183	186	164	175
Italy	60	61	49	34	22
Japan	1,561	1,852	1,811	1,781	1,987
Korea:					
North [2]	1,500	1,600	2,100	2,200	2,200
Republic of	2,001	2,691	2,944	4,559	5,897
Morocco: Southern Zone	531	574	562	513	454
Netherlands [2]	4,400	4,300	4,400	4,400	4,400
New Zealand	2	2	2	2	[2] 2
Peru	18	19	62	64	31
Portugal	456	550	625	581	478
Rumania	12	[2] 17	[2] 17	[2] 17	[2] 17
Spain	2,507	3,129	3,440	2,888	2,765
Switzerland [2]	11	11	11	11	11
Union of South Africa [3]	463	484	477	656	[2] 700
U.S.S.R.	74,118	79,953	86,121	87,423	[2] 87,100
United Kingdom	4,662	4,476	4,418	4,029	4,027
United States (Pennsylvania)	28,900	25,338	21,171	20,649	18,817
Vietnam:					
North	1,340	1,200	1,980	2,260	[2] 3,300
South	2	13	22	22	30
World total (estimate)[1]	162,200	169,100	175,400	187,100	189,500

[1] This table incorporates a number of revisions of data published in previous Anthracite chapters. Data do not add to totals shown because of rounding where estimated figures are included in the detail. An undetermined amount of semianthracite is included in the figures for some countries.
[2] Estimate.
[3] Reported as sales.

Compiled by Pearl J. Thompson, Division of Foreign Activities.

TECHNOLOGY

Mining.—The feasibility of fracturing anthracite by hydraulic means was demonstrated by the Bureau early in 1960. A number of large blocks of anthracite from various beds and localities in the producing region were cut and broken by a high-pressure water jet at pressures less than 4,000 pounds per square inch.

Subsequent to this demonstration, a production-type hydraulic mining project was planned and initiated in a mine section in the Northern field. The anthracite bed to be worked is 12 feet thick and pitches from 15 to 20 degrees. The pump, pressure pipeline, and other equipment for the project have been ordered, and installation has been started at the mining site.

A newly designed monitor for holding and controlling the high-pressure nozzle and water jet features straight-line motions to maintain the jet in position for best cutting action. Steel pipe with special moveable "chicksan" joints will be used for the pressure line in the monitor. Safety and high productivity (tons per man-shift) are the primary objectives of the project scheduled to start mining about the middle of 1961.

In the continuing research on the vertical hydraulic transportation of solid materials by pipeline, a lock-hopper feed system was designed

and installed at the Bureau's Anthracite Research Center at Schuylkill Haven, Pa. This system was devised to feed coal through a screw conveyor at a rate as continuous as possible into the moving stream of water in the transporting line. With the hopper-feed method, it is not necessary to pass the coal through a hoisting pump. This will avoid degradation by the pump, which had been determined to be 6 and 11 percent, respectively, for nut-size anthracite and bituminous coal. A hoisting rate of 27 pounds of anthracite per second was attained with a water velocity of 8 feet per second in the 6-inch line by means of the lock-hopper system. Degradation was indicated to be about 3 percent. The required velocity of water in the transporting line was found to be about four times the settling rate of the solids to be hoisted. Other solid materials transported successfully by the system included a limonite iron ore (specific gravity of 4), which required a water velocity of 15 feet per second.

Further progress was made by the Bureau [5] in research on the application of sound waves to roof-control problems in coal mines. Underground tests with a laboratory-built transducer in the Bureau's experimental mine confirmed the validity and potential usefulness of the sonar method for examination and exploration of roof strata to determine hidden faults and other anomalies of the roof rock.

The Bureau issued tentative safety recommendations [6] in 1960 to provide guidance for the safe handling, storage, and use of field-mixed ammonium nitrate blasting agents. The tentative nature of the recommendations is stressed owing to the rapidly changing technology in the development and use of this class of blasting agents.

Use of plastic bags [7] filled with water is required in some production divisons of the National Coal Board of England. The filled bags are used in blastholes as partial stemming with all explosives used underground. It has been found that use of the water ampoules reduces dust and fumes and probably reduces the danger of igniting mine gases when blasting.

Mine-Water Control.—By the end of 1960, a total of 28 control projects had been approved for Federal participation under the joint Federal-State Anthracite Mine-Water Control Program initiated in 1955. Four projects were cancelled before the expenditure of any public funds, and an additional three projects were terminated owing to economic conditions and the changed water problem subsequent to the Knox mine-flood disaster in 1959.

Under the program, 29 vertical turbine-type pumps with an aggregate capacity of 143,000 gallons per minute were supplied to control the levels of underground water pools. The surface drainage improvements installed through the program prevent surface water from seeping into underlying mine workings. It is estimated that these surface improvements keep nearly 3 billion gallons of water out of the mine each year. Thus, the surface projects not only protect anthra-

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[5] Mongan, Charles E. Jr., and Miller, Thomas C., Use of Sonic Techniques in Exploring Coal-Mine Roof Strata: A Progress Report: Bureau of Mines Rept. of Investigations 5617, 1960, 15 pp.

[6] Staff, Tentative Safety Recommendations for Field-Mixed Ammonium Nitrate Blasting Agents: Bureau of Mines Inf. Circ. 7988, 1960, 12 pp.

[7] National Coal Board, East Midlands Division, England, Water Filled Bags for the Stemming of Explosives: Instruction issued Sept. 30, 1959, 3 pp.

cite reserves from flooding but also serve as antipollutant measures for the streams of the anthracite region.

Two mine-water control projects were approved in 1960. One, a pumping installation, required three pumps with a total capacity of 12,000 gallons per minute. The second, a surface drainage improvement, would prevent an estimated 80 million gallons of surface water from seeping into underground workings each year.

Preparation.—Initial Bureau research on the effects of various flotation reagents at different strengths indicated that efficient cleaning of anthracite fines by flotation is an individual problem for each preparation plant. It was found that fines from three different sources reacted differently to the same flotation medium.

In continued work on the preparation of ultrafine anthracite, minus 18-mesh anthracite was reduced at a feed rate of 50 pounds per hour in an air-swept ball mill. About 86 percent of the product was minus 5 microns in size, but only about 6.5 percent was minus 0.5 microns. Other tests with feed of 96 percent through 325-mesh anthracite were made in so-called fluid energy mills in which attrition is accomplished with compressed gases. With two passes through the mill at a feed rate of 30 pounds per hour, the average particle size of the product was 2.62 microns.

Bureau investigations [8] of crushing Chestnut-size anthracite disclosed that gyratory crushers produced larger percentage of Buckwheat No. 1 and Rice, the desired sizes, than the other tested types, impact, ring-type hammer, and jaw crushers. The addition of water to the crusher feed had various effects on product size and capacity of the several crusher types.

The preparation characteristics of mixed anthracite from the Mammoth and Holmes veins were determined [9] by the Bureau to be a potential recovery of 64 percent of the feed with 11.0 percent ash when separated at 1.90 specific gravity.

Clarification of coal-washery waters was claimed to be [10] economically justifiable since it provides greater flexibility in the control of the ash content of the fine sizes, simplifies the control of washing operations through slime elimination, and reduces stream pollution. Various methods of employing flocculents were described together with data to guide in the selection of the proper compound and equipment for the most effective application.

Anthracite preparation plants have pioneered in the use of radiation devices to obtain accurate and automatic control of dense media in coal cleaning operations. Improved and standardized quality of product has been attained automatically at a breaker [11] by using radiation to detect changes in the preparation process and immediately initiate corrective impulses into the cleaning system so as to maintain the preset standards.

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[8] Eckerd, J. W., Sanner, W. S., and Baker, A. F., Crushing Chestnut-Size Anthracite to Produce Buckwheat No. 1 and Rice Sizes: Bureau of Mines Rept. of Investigations 5578, 1960. 20 pp.

[9] Ingersoll, D. E., and Eckerd, J. W., Washability Characteristics of Mammoth and Holmes Vein Anthracites: Bureau of Mines Rept. of Investigations 5569, 1960, 12 pp.

[10] Oliver, Robert H., and Felsey, C. Lindstrom, The Application of Flocculents to the Clarification of Coal Washery Waters: Mechanization, Vol. XXIV, No. 3, March 1960, pp. 47–51.

[11] Coal Age, Automatic Density Control: Vol. 65, No. 7, July 1960, pp. 87–90.

Polyethylene plastic chutes [12] have been tested in several anthracite preparation plants. Advantages claimed over steel chutes are resistance to corrosion from acid water, lighter weight, and equal resistance to abrasion by fine anthracite.

New preparation equipment [13] with a capacity of 780 tons per hour was installed or contracted for at two anthracite preparation plants in 1960.

Utilization.—In the Bureau's investigations of the gasification of anthracite through reaction with hydrogen at elevated temperatures and pressures, a small-scale unit has been designed to study the principles and the variables of the process. This unit was being installed at the close of 1960 in the Anthracite Research Center, Schuylkill Haven, Pa.

Additional research on briquetted anthracite metallurgical fuel examined the effects of variations in raw-material mixes, coal-particle size, and calcining procedures. Maximum tumbler stability of 67 percent and compressive strength of 5,029 pounds were obtained with a calcined briquet made from a raw-material mix of 82 percent anthrafines, 8 percent coal-tar pitch, and 10 percent bituminous coal. Particle size of the raw materials affected both the tumbler-stability factor and compressive strength. Anthracite particles screened between 40- and 80-mesh yielded the strongest briquets. Bituminous coal particles larger than 20-mesh decreased the compressive strength. A study of calcining methods showed that indirect firing generally gave a stronger briquet. Also, bulk charging of briquets into the calcining equipment results in lower final briquet strength with either direct or indirect firing.

A festive fireplace fuel was made at the anthracite center by extruding an anthrafine mixture as 3- and 4-inch diameter, hollow logs. The best mixture was determined by burning to be 53 percent anthracite silt, 27 percent hardwood dust, 5 percent starch, 5 percent color chemicals, and 10 percent paraffin. The logs formed easily, had sufficient durability for normal handling, ignited readily and burned with a multicolored flame for 4½ hours.

Bureau experimentation was continued on the effects of fuel size and shape on airflow in a simulated metallurgical stock column. It was indicated that shape and differences in bed porosity due to shape are responsible for the variations in pressure drop of the airflow through the column. When shape and bulk density are similar, the pressure drop becomes a function of size. For example, Egg-size anthracite had a pressure drop of 0.9 inch in water column, whereas Stove-size anthracite averaged 1.2 inches.

Combusion tests [14] of small, industrial-type stokers with Rice-size anthracite under ASME Code procedures produced heat efficiencies above 80 percent for about one-half of the feed rates studied on water-cooled grate stokers. The maximum efficiency for a traveling-grate stoker was 62 percent, and for a side-retort unit it was 73 percent.

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[12] Saward's Journal, Coal Industry Using Plastic: Vol. 43, No. 33, Nov. 12, 1960, p. 356.
[13] Coal Age, 1960 Preparation Sales: Vol. 66, No. 2, February 1961, pp. 90–91.
[14] Tenney, R. F., and Eckerd, J. W., Performance on Small Industrial-Type Anthracite-Burning Stokers: ASME Code Tests: Bureau of Mines Rept. of Investigations 5607, 1960, 57 pp.

A new use for anthracite was demonstrated [15] by injecting anthrafines directly into the iron-smelting zone of the Bureau's experimental blast furnace. With the anthracite injections, furnace requirements for metallurgical coke can be reduced by 20 to 24 percent. Also, the sulfur content of the pig iron product was lower than when coke alone was used in the furnace.

Results of tests on two standard 10-foot diameter, anthracite-fired gas producers at a brick plant were published.[16] With Rice and Buckwheat No. 1 sizes of anthracite the producer hot-gas efficiency was 95 percent at an average gas offtake of 540° F.

Tests [17] on the gasification of Chestnut-size bone anthracite in a 10-foot-diameter gas producer indicated that gas could be produced continuously from anthracite with 35 to 50 percent ash whenever conditions justified the necessary development work.

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[15] Ostrowski, E. J., Royer, M. B., and Ropelewski, L. J., Injecting Solid Fuels into Smelting Zone of an Experimental Blast Furnace: Bureau of Mines Rept. of Investigations 5648, 1960, 14 pp.

[16] Tenney, R. F., Clendenin, J. D., and Sanner, W. S., Anthracite Gas-Producer Tests at a Brick Plant: Bureau of Mines Rept. of Investigations 5556, 1960, 25 pp.

[17] Eckerd, J. W., Clendenin, J. D., Sanner, W. S., and Morgan, R. E., Gasification of Bone Anthracite; Bureau of Mines Rept. of Investigations 5594, 1960, 24 pp.